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EXPLORATION IN NORTH-WEST MONGOLIA AND DZUNGARIA.*

By DOUGLAS CARRUTHERS.

The exploration of Mongolia has been almost entirely monopolized by the Russians. The great unknown that lay beyond their Siberian frontier fifty years ago was a "loadstar" to the Russian pioneers, who were for ever pushing on from their newly acquired territory into what, they thought, might be richer lands. Thus, the wide Mongolian plateau and Dzungarian steppes were explored by men chiefly of Russian nationality. In consequence, there is, perhaps, no country in the world on which there is so little information in the English language as Mongolia and Dzungaria.

The mysterious and almost incredible wanderings of Atkinson published in 1858–60 (whose unsatisfactory accounts are almost impossible to follow), the journeys of Ney Elias in 1872–3, and Younghusband in 1887, give us the sum total of our knowledge of things Mongolian in the English language. In the Yenisei basin we had no forerunners, and in Dzungaria but one, Etherton, who, in 1909, rode from Kulja to Tulta in the

* Royal Geographical Society, March 25, 1912. Map, p. 640. The journey which is here described was undertaken by Mr. J. H. Miller, Mr. M. P. Price, and myself in the years 1910–11. Notice of it appeared in the *Journal* of the Royal Geographical Society in March and October, 1910, and February and October, 1911. For the first eight months the party worked together in the upper Yenisei regions and in Mongolia. During the concluding eleven months Mr. Miller and I travelled in Dzungaria, and then crossed Turkestan to India, arriving home in December, 1911; whilst Mr. Price journeyed through Russian-Turkestan and the Caucasus, and reached England in March, 1911. My thanks, and the thanks of all geographers, are due to the above-mentioned gentlemen—Mr. J. H. Miller and Mr. M. P. Price—who bore the entire expenses of this journey, and on whose never-failing energy and keenness the success of the expedition largely depended.

Altai, and thence to Zaizan. Of course, I do not enumerate those who have merely traversed the Chinese Imperial High-road, and have left no account of Dzungaria proper. But amongst the Russian explorers, we have the illustrious names of Prjevalsky, Kozloff, Potanin, Piertzov, Matoussowski, and others. The Russian does everything on a vast scale, his journeys are colossal undertakings. Prjevalsky, the pioneer, covered 19,500 miles of route and spent nine years and four months over it. Kozloff has crossed the Great Gobi five times and in three different directions.

To these great travellers we are indebted for all our knowledge of that immense area which stretches from Siberia to the Great Wall of China. The accounts of these journeys fill numerous bulky volumes but, alas! their contents are hidden from most of us. For this reason I am trying to put on record all the information that I can possibly collect about the region, so as to give a fair idea of the vast stretches of country which are, to all intents and purposes, an unknown land to the English reader.

The subject of Mongolia has always had a hazy mystery attached to it, and has always been one of absorbing interest. There lies the ancient home of the greatest Asiatic races—the Mongol and the Turk, whose descendants now rule in Pekin and Stamboul. There rose the Uigur civilization, whose origin is shrouded in immense antiquity; those are the wind-swept plateaus which gave birth to the Mongol demi-god, Jenghis-Khan.

Of late years Mongolia has attracted but little attention in the West. It was in the twelfth century that Europe was really interested in Mongolia. She was then staggered by the reports that reached her of the triumphs of that semi-mythical personage "Prester John" Khan of the Keraits. Embassies went to and fro. High Asia loomed large in the imagination of the peoples of Europe in the twelfth century. Then came the Mongol invasion, and the Western world learnt only too well to appreciate the demon-like ferocity and barbarity of the Tartars.

But since the destruction of the Mongol power, Tartary has sunk into oblivion. The centre of interest has shifted to Cathay. Formerly the Tartars were only approached by the landward gates. Embassies and missions braved the 3000 miles of Asiatic steppe, in order to reach the courts of the Khans of Karakorum. But, later, the depths of Mongolia were forgotten, for men sailed in ships to the great ports of China. Europe keeps but one impression of Mongolia—that of a far, bleak land, where the remnant of a great people wander in semi-barbarism, of black-felt tents and countless flocks, and of a restless spirit, which might again one day "burst all link of habit" and overrun the West.

Although scope for pioneer work is about as hard to find here as it is now in Africa, or, for that matter, anywhere else in the world, yet a great deal of detailed geographical work remains to be done. By the careful study of the labours of all previous travellers in these regions, we have

been able to spend nearly two years in traversing large areas of little-known country, adding to our stock of knowledge of the fauna and flora, and making considerable addition to the existing maps.

The region which we chose as a field of work comprised: (1) The northern declivities of the Mongolian plateau, to the west of Lake Baikal. Here the headwaters of the Yenisei river, which rise in a mountain-girt basin on the plateau, break through the enclosing ring of mountains and debouch on to the Siberian lowlands. The topography of the whole of this basin is but vaguely sketched on the existing maps. It possesses an interesting population and curious conditions—half Mongol, half Siberian. (2) North-western Mongolia, in the region of the lakes called Ubsa, Uriur, and Achit Nor, together with the glacial range of Turgun or Kundelun. (3) The extreme eastern end of Tian Shan mountains, namely, the Karlik Tagh and Bar-Kul ranges. Here our work consisted of a thorough revision of the maps and an investigation into the fauna of the region.

Besides this, we traversed the whole of the intervening region of Dzungaria, chiefly with the object of forming natural history collections. But the nine months we spent on its inhospitable deserts and border mountain ranges will enable us to put on record much of interest as regards the people, topography, zoology, and the present conditions of a land which may some day be of account.

It is barely possible here to touch on any but the leading features of the country traversed. Detailed accounts of each subject will be dealt with separately, I hope, at some future date.

Our party made a start early in June from the Siberian frontier village of Kuzhabar, which is situated on the edge of the forest zone, within view of the Syansk mountains which lie to the south. All the way from the Siberian railway, which we left at Atchinsk, we had traversed the good, black-soil area, with its well-to-do population of colonists. Minnusinsk was the last of the Russian towns and Kuzhabar the last village we saw. After leaving Kuzhabar, for four and a half months of travel and for about 1000 miles traversed between there and Chuguchak on the borders of Semipalatinsk and Dzungaria, we touched on but one small settlement of Tartars and Uriankhai, and one of Chinese and Chantos. This entire region is a Nomad's land.

Up to the edge of the forest reach the settlements of Siberian colonists, mixed with a few Avakan Tartars and still fewer Kalmuks. Here, where the rich, open plain lands of Siberia end and the country rises towards the first steps of the Mongolian plateau, terminates the advance of Russian colonization. Beyond lies the unknown depths of forest, backed by the border ranges that serve as a frontier to the Chinese Empire.

Leaving Kuzhabar on June 2, 1910, we spent the next two and a half months amongst the forests, on the lakes and waterways at the sources of the upper Yenisei.

The basin of the upper Yenisei comprises the area drained by the rivers called the Kemchik and the Ulu-Kem, whose two heads are the Khua-Kem and Bei-Kem. The area is roughly 64,000 square miles. These two rivers, the Kemchik and Ulu-Kem unite, before bursting through the mountain wall of the Syansk range, at the point called the Kemchik Bom. The encircling wall of ranges round the basin is complete, except at this point, where a deep-cut ravine lets the drainage out through a series of rapids on to the Siberian lowlands. From the neighbourhood of Minnusink to the Arctic ocean the Yenisei has a drop of only 900 feet. Its height at Cha-Kul, in the basin, is 1656 feet.

The average height of the floor of the basin might be taken at between 2000 and 3000 feet, whilst the border ranges rise to between 8000 and 9000 feet in places, but have numerous passes and cols of 4000 to 5000 feet altitude.

After a most arduous trek of eleven days through dense forest we emerged on to the Syansk range. During these days we had plunged almost blindly through the tangled undergrowth and bogs of virgin forests. We made about 5 miles a day. Men, in advance, cleared the way with axes for the baggage-horses, which were sorely tried by the fallen timber, the heavy going, and the myriads of mosquitoes. We seldom got any view. Damp, sodden forest walled us in, festoons of lichen hung from the branches, showing hoary white against the dark pines. Trunks piled on trunks lay across the ground, all clothed in moss. Swampy bottoms, half lake, half forest, looked so mysterious, that if some prehistoric monster had raised its snaky head to have a look at us, it would not have been surprising. We should have felt its presence was all in keeping with its surroundings, and was, in fact, more natural than our own.

We appreciated the change by comparison when at length we toiled to a summit of the Syansk and gazed down for the first time into the secluded basin beyond. The forest had led us up to beautiful upland meadow, knee-deep in marigolds and luxuriant bog-plants. Higher we climbed over moss, lichen, and dwarf rhododendron to rocky screes and a snow-patched summit. Beyond and below were long reaches of pleasanter country, park-like meadows, and depth of forest; winding rivers show here and there, and rocky summits of distant ranges rose above the "taiga."

The Syansk range, which together with the Tannu-ola mountains encloses the basin, is of no great altitude, but its appearance is enhanced by the peculiarly rough jagged summits, which it lifts up above the forests. We found these summits to be very variable in character; some were of wind-worn granite and of excessive steepness, others were rounded and worn smooth, and very easy of access. The highest summit we attained was only 8200 feet, and it is doubtful if they rise above 9000 feet in any place. Broadly speaking, the Syansk range forms the first step from the Siberian lowlands to the Mongolian plateau. The upper Yenisei

basin beyond is the first terrace. The Tannu-ola, which borders the basin on the south, is the second step which leads up to the main plateau, viz. Mongolia proper. The first terrace possesses none of the features peculiar to Mongolia. It belongs to Siberia rather than the dry plateau land to the south. The dense forests of Scotch pine, larch, and spruce show this. The inhabitants are not pure Mongol, but a forest-dwelling race of Finno-Tartar stock, very different to the nomads of the wide, open steppes of Mongolia. But still, even in the basin, the transition stage between Mongolia and Siberia can be noticed. The northern and eastern parts are almost entirely covered with forests; lower down, in the central portion, open expanses of grass-lands appear, and little bits of steppe along the river-banks. In the south and south-west this increases, whilst the forests occupy less space. The Tannu-ola is the true dividing line, for on reaching its summit all forests stop, and we enter the drier, treeless plateau region.

We made many ascents on to the different isolated uplifts which form, as a whole, the Syansk range—"Taiga," as they are called by the superstitious dwellers in the forests below. For those naked summits of rock which lift themselves above the silent forest have a peculiarly uncanny atmosphere. The Uriankhai deem them haunted, and call them "Taiga," *i.e.* "The Wild." Fallen timber, dense tangle of rhododendron, and soft bogs made the lower slopes difficult to negotiate, whilst the summits were in most cases composed of gigantic screes of huge granite boulders. In some instances these were flat-topped, and in others capped by a serrated ridge of wall-like steepness. Want of symmetry in the uplifts, a difference in the structure and texture of the rocks, caused a watershed of no uniformity. As an unbroken range the Syansk does not exist. The watershed forms great zigzags, and the upper waters of the rivers flowing north and south are dovetailed in between each other.

Mapping in this region was fascinating work, but tedious and overpowering by the very magnitude of it. Here were thousands of square miles of absolutely unmapped country laid out around one. The difficulty of even roughly surveying was inconceivable. Looking down into a valley, it was impossible to tell if it drained into China or Siberia. A group of lakes in a marshy flat might drain into different river systems. One climbed tediously through dense forest on to a ridge, only to find all view obstructed by timber, and one had to search diligently amongst a maze of bogs and lakelets for the water-partings. The scenery is one of extreme opposites. Nothing could be more monotonous than the endless expanse of unbroken, sombre forest, and nothing more striking than the upheavals of bare, jagged peaks that rise suddenly out of it. Overlooking the central basin, one is almost repulsed by the dreary monotony of the landscape, the ridge after ridge of endless sodden forest, and the uninspiring reaches of "taiga." Only do the eyes find repose and satisfaction when the contrast is given, and they rest on some jagged mass of

snow-patched rock and crag, heaved up out of the forest far into the sky, whose altitude defies the forest and where naked rock holds sway.

Although the greater portion of the country is forested, yet certain parts are composed of idyllic park country of "rolling grass and open timber" dotted with lakes, and supporting a considerable population of nomadic Uriankhai. We had expected to find the region at the sources of the Yenisei idyllic, and we were not disappointed. Here was a land of sunny meadows and shadowy forest, dancing streamlets and great swirling rivers. Here the Nature-worshipping Uriankhai dwelt in picturesque encampments. Here was a lakeland of a thousand lakelets, where great fish rose and the "loon" laughed. Yet always at the back we had a glimpse of the border ranges, which gave one the impression of being hemmed in, of being in a secluded valley, shut off from the outer world.

Were it not for the waterways, travel would be exceedingly difficult. We often used canoes for river journeys, and actually transported the whole expedition, kit and all, down the Bei-Kem and Ula-Kem for 180 miles by raft.

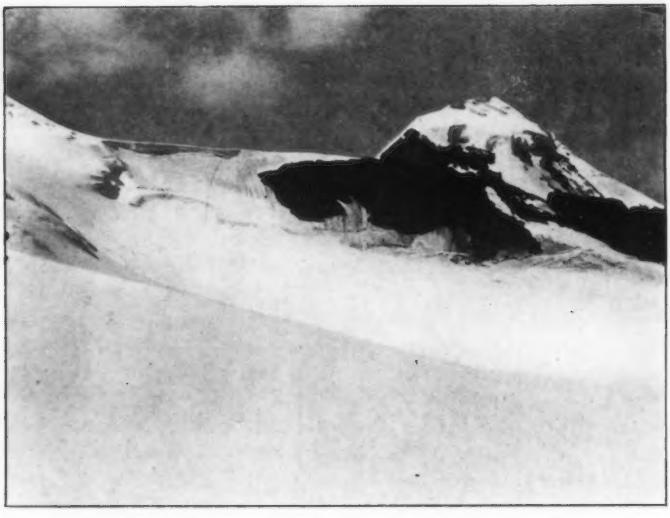
The excellent fish that swim in these rivers attract many Siberians in the summer months. These men come up by canoe, fish all the summer, pack and salt their catch in barrels, and finally raft it down the Yenisei to the big Siberian towns, Minnusinsk and Krasnoyarsk. Fur-hunters, too, penetrate into the recesses of the forest in search of the sable, for which this region is famed. Apart from these there are but few colonists, for this region is virtually under the suzerainty of China.

In such a secluded region a peculiar inhabitant might be guessed at. The Uriankhai, the only indigenous inhabitants of the basin, are a race of Finno-Tartar stock; that is to say, of a race possessing the characters of both the Mongol and the Finn. There is not very much known about these tribes. They are doubtless the original Uriankhai, or Uriankut, one of the six divisions of the Mongol people early in the sixteenth century, but the word merely signifies "forest-dweller," and we find mention, also, of Uriankhai in Siberia and on Lake Kossogol.

Sir Henry Howorth thinks that the present Uriankhai of the upper Yenisei basin are the descendants of the ancient inhabitants called, generically, Yeniseians. These people have left traces of their old distribution all over the Avakan and Chulym steppes, in the shape of great burial-mounds, stone circles, and rock-cut inscriptions—in a language still undecipherable. Stone, bronze, and iron instruments have been found in the mounds. From the original Yeniseians sprang the Samoyedes, who were driven, by the incoming hordes of Kirghiz (Kazak ?), into the treeless north country within the Arctic circle; whilst their kinsmen, the Uriankhai, who are the forest-dwellers to this day, were pushed back into the secluded valleys of the upper Yenisei basin. The fact that these people still call themselves "Tuba" is of importance, and they certainly ranged northwards as far as the river of that name until a comparatively

URIANKHAI FAMILY GROUP AND "TEPEE" IN THE UPPER YENISEI BASIN.

TYPICAL ENCAMPMENT OF URIANKHAI. HERDS OF REINDEER IN FOREGROUND.



"KUNDELEN" OR "KHARKIR" PEAK, IN THE TURGUN GROUP.

TYPICAL SCENERY IN THE SYANSK MOUNTAINS. ALTITUDE 6000 FEET.

recent date. At the present day, their isolated habitat protects and preserves them from the forward march of more powerful tribes.

These peculiar people, shy, superstitious, and uncouth, live in isolated encampments all over the basin, and apparently do not extend beyond the border ranges. Their southern limit is marked by the line of Mongol "karauls," or guard-houses, which are to be found dotted, at intervals of about thirty versts apart, all along the southern foothills of the Tannuola range. They are divided into five tribes, of which only two are true forest-dwellers, dwelling in birch-bark tepees, and dependent upon their herds of reindeer for existence. This latter peculiarity is of interest in that this is the most southerly range of the reindeer. Their locality here, moreover, is isolated; their nearest neighbours are those belonging to the Tunguses of the Vitim plateau, to the east of Lake Baikal. It seems almost as if the Uriankhai and their reindeer have been left "stranded," as it were, in this isolated highland. Ages ago, when the ice-belt shifted northwards, these tribes were left on this insular mountain-top, which still preserves something of the nature of what the lowlands possessed in those days. It is a case of *altitude* compensating for *latitude*.

On different occasions we visited the various tribes of the Uriankhai in many different localities, and got a very good idea of the peculiar conditions under which they live. But as the geographical material of this journey is in itself more than we can deal with in this paper, I shall leave these more ethnological subjects to be described at length elsewhere. Briefly, the Uriankhai * are semi-nomadic people who inhabit, sparsely, the whole of the upper Yenisei regions. In the forest areas they utilize birch-bark "tepees" or "wigwams," but on the open grass-lands of the Ulukem and Kemchik the ordinary felt-covered yurt, as in general use by all nomads from Manchuria to Asia Minor.

We speak of them as being nomadic, but this is only as condition makes. Many encampments make only two moves in the year, and then only for a very short distance—a summer and a winter residence, in fact. But the reindeer-keeping tribes probably shift camp more often. Their spring and autumn migrations are movements of some consequence, since their reindeer need the cool heights of the "Taiga" during the summer's heat. At this season their white "tepees" cluster in some high meadow valley, where pasture is so abundant as to last all through the hot months. Here on marigold-strewn boglands feed the herds of reindeer, wandering at will, but spending the heat of the day panting under the shade of the spruce forests. It seemed, almost, as if this southern clime was getting too hot for them. As to the natural history of the reindeer, both wild and

* The Uriankhai generally appear in Russian literature as Soiots. This is probably due to the fact that there is a tribe of reindeer-keepers in Central Siberia called Soiot, and the first explorers of these regions recognizing the likeness in habits of the Uriankhai, called them by the same name. The natives call themselves "Tubas."

domesticated, my companion, Mr. J. H. Miller, made copious notes and collected much detailed information, which he will publish elsewhere.

A few of the traits of these curious people may prove of interest, from the point of view that environment is the strongest factor in determining character. We have shown how superstitious they are, which is accounted for by innate fear of all things they cannot understand. Their shyness, dislike of strangers, and dread of their lamas and chiefs are again the result of superstition and seclusion. Sadness and melancholia are stamped on their faces, as is natural to a people who are in constant fear of the "genii" of the mountains, rivers, and forests, whose whole time is taken up with propitiating the gods lest evil befall them. The Uriankhai is a product of the forest as the Arab is of the desert. The one is the antithesis of the other. Environment has moulded the character of each to his surroundings. The fearless believer in one God, the nomad of the sunlit desert, compares strikingly with the superstitious inhabitants of dark, damp forests, fearsome of evil spirits, and cringing under their witch-doctors. All through life the forest-dweller is in fear of offending the deities, and at death his corpse is carried out and placed on some lone hilltop, where the wild beasts are expected to devour it if the man has led a good life; but bad Uriankhai have not that doubtful honour bestowed upon them.

There seems to be a certain limitation to the ideas of the Uriankhai. Although he lives in a land of rivers and is in constant need of river-transport, yet he possesses no craft. He makes all his household utensils of birch bark or reindeer skin, but has never learnt to make a canoe. It is true he resorts to a raft when forced, by necessity, to transport goods down-stream or in order to fish on the lakes, and under Russian teaching they become good boatmen, but he has failed to make use of the great waterways that intersect his native country. Fish swarm in extraordinary numbers in the rivers and lakes of the basin, but we found that the native only catches them, in a desultory manner, in the backwaters, using a primitive net of horsehair. He is lazy and independent to a degree. He works when he has a desire to work, but he would far sooner run wild in the forests, hunting the roe, elk, and wapiti, and live in comparative poverty, than work for the Siberian colonists and thereby earn a good wage. He has no desire to better himself. Herdsmen and hunters by profession, living entirely on the produce of their flocks of reindeer, they live a life of contentment, even if of considerable hardship. Their skill in hunting equals that of the North American Indians. The fact that this region is a very fine fur country makes the Uriankhai of some value to fur traders, and gives him in return an ample supply of the necessities of life. The Siberian traders advance him tea, tobacco, etc., and he probably pays off his yearly account in furs and skins by a month's hunting.

Amongst a people living in densely forested regions, isolated in remote secluded valleys, shut off from the outside world and surrounded only by and dependent solely upon Nature, superstition, of course, runs riot. His

superstition takes outward form in that crudest and most primitive of all religions—Shamanism or Nature worship. It consists primarily of the propitiation of evil spirits, resulting, of course, from fear—fear being the original foundation of all religion. Shamanism is rather a system of propitiation than the worship of a deity. The mystery of the sodden, "taiga"-clothed hills, the dark silent valleys, and the mountain crags that toss their height above the forest, fill him with awe and crowd his thoughts with superstition. The Uriankhai, in their simple faith, see mystery, and therefore the supernatural on all sides, and hasten to appease the gods for fear of offending. The howling wind is obviously a god in anger; the swift-running river gods hinder his crossing and jeopardize his life; the lonely summits of granite boulders, storm-riven and streaked with snow, are surely the thrones of gods and not fit places for men. The abundance of sudden storms, thunder and lightning add to his nervousness. The "terror of Pan" is everywhere. A crude race, which is dependent solely upon Nature for all its wants, naturally worships the hand that gives. Shamanism is rife, and nature-worship is practised under a thin guise of Buddhism. On every possible occasion the Uriankhai propitiate the gods in order to avoid harm at their hands. Buddhist lamas have some power amongst them, but in the case of sickness, at any rate, the Uriankhai invariably resort to Shamanism. Demons of sickness require the practised hand of the witch-doctor. When it is the shadow of death that falls on them, then, with "tired" head, beating drums, and drooning chant, the Shaman doctor wearies himself out in delirious madness.

The Buddhist element is noticed especially at the centres of Uriankhai life, such as the Dora-Kem steppes in the upper portion of the basin and at the Chedan valley in the Kemchik. At both of these places a considerable population was concentrated; these were the headquarters of chiefs, and each possessed a Buddhist place of worship, designated "kurin." Many such exist, but we saw only these two.

It would be quite impossible to give an estimate of the population of the upper Yenisei basin. M. Paul Chalon gives the maximum population at about 100,000 souls, and the area of the Uriankhai territory at 120,000 square versts, or 52,555 square miles. It suffices to say that there are vast areas of splendid country untenanted, which means a very sparse population in proportion to the area. Now and again one finds a valley with a considerable population (these are always the drier valleys, occupied by yurt-dwellers, the wigwam or "tepees" dwellers generally being found in small isolated encampments), but on the other hand, one travels for days without seeing a native. The land could support a much larger population. Excellent pasture-lands, untouched fisheries, and mineral wealth lie awaiting the future colonist.

The fauna of the basin and its surrounding ranges includes some curious types. Besides being the most southern limit of the reindeer in a wild and domestic state, the rivers constitute the home of a few beavers.

Elk, wapiti, roedeer, muskdeer, and bears haunt the forests and form the quarry of the Uriankhai hunters. The furs are of excellent quality. In the old days the tribute of the Mongol Khans consisted largely of furs; as part of a tribute sent to the Czar of Russia by the Khan of the Ubsa region, we read of "a hundred sables and two beavers."

After penetrating to the little-known country that lies at the north-east corner of the basin, midway between the Yenisei waters and Lake Baikal, where every physical feature which we mapped—lakes, ranges, and rivers—were new to existing surveys, our party divided. Messrs. Miller and Price visited the lake-land of the upper Bei-Kem, saw that mysterious Toji-Kul, lake of crystalline beauty, and centre of Uriankhai life in the upper basin. Meanwhile, I made further maps in the central portion between the Bei-Kem and Khua-Kem. Then the whole party drifted down the river by raft to Cha-Kul, on the Ulu-Kem, the trading centre of the basin. Here a nondescript collection of Tartars, Uriankhai, a few Russians, and even a Chinese or two live by trading with the natives.

So far our survey work had been of extreme difficulty. Dense forests made prismatic-compass work alone possible. But at slow pace we carefully filled in large areas, and by collecting and making use of all previous knowledge we hope to give a fair idea of the whole topography of the basin. From Cha-Kul onwards the open nature of the country made work easier. We found ample scope in the country to the south of Kemchik, on our way over the Tannu-ola, every feature being new to existing maps. The variety of scenery, viz. dense forest and open steppe, is such a factor in determining the distribution of the inhabitants, etc., that we have shown this on our maps as clearly as possible.

The only routes that cross the basin, keep, of course, to the open country. There is an ancient route that leads between Uliassutai in North Mongolia to the Avakan steppes of the Yenisei. It crosses the Tannu-ola by the Chamar Daba, passes along the south side of the basin, across the Kemchik and over the western Syansk range. This can be used for wheeled traffic. A portion of it between Cha-Kul and the Kemchik at Bievkoff presents the appearance of a Roman highway. It runs perfectly straight, is raised above the level of the surrounding steppe, has a well-metalled surface, and a drainage ditch on either side. Natives say it was made a thousand years ago; it was probably the work of some Mongol khan. There is little to deduce from it. In fact, it seems to be a "folly," made with no object. The country this route passes over is the sort that does not need road-building. It is open, dry steppe over which one could drive in any direction, whereas if it had been in the forest and bog area, one could well imagine what a boon it would be to travellers and for transport. At any rate, it shows that once this Cha-Kul steppe was an important locality, and the territory of some powerful prince.

In the drier parts of the basin, where steppe conditions are making themselves felt, we find the Uriankhai living the quaint life of a semi-sedentary

character. Still living in the easily-shifted yurts, they cultivate patches of land where they grow millet, barley, and wheat. There are also traces of a much larger area of land being under cultivation in old days. These facts bring up the question of who were the ancient inhabitants, traces of whose handiwork so often showed themselves. Evidently they were a more important and more advanced people than the degenerate tribes of the present day. No mere tent-dwellers scattered the land with stone monuments, carved pillars, and irrigation canals. Those ancient people had more ambition than the herding of reindeer and cattle. Our first introduction to these old sites was on the road between Atchinsk, on the Siberian railway, and Minnusinsk. Here, where we first encountered the pasture lands, namely, the steppes on the banks of the Chulym river, there we first found "kurgans," or "tumuli"—grave mounds—surrounded by circles of upright stone slabs. All along the Avakan steppes they were extremely numerous. Later, in the Cha-Kul steppe of the Kemchik valley, we found a few relics, but as we journeyed southwards they became less numerous. Beyond the Altai in Dzungaria, the only remains were grave mounds. It appears as if the main habitat of these ancient people—the Yeniseians, and later the Uigurs—extended over the whole of north-west Mongolia, the Yenisei basin, and the Avakan steppe on the edge of the Siberian plains. According to M. Grano, of Helsingfors, the majority of the inscriptions are old Turkish, hence the deduction that it formed a part of the Uigurs' empire—that ancient nation which existed long ago, and about which the most learned historians know scarcely anything. In many parts of the Yenisei basin there are evidences to show that these people had a much larger area of land under cultivation than there is at the present day. Old irrigation canals are so numerous in the Uik (Ujuk) valley, that the Russian colonists have opened them up afresh and used them with success. These cultivated areas are the localities of the greatest number of graves and carved pillars, etc. Antiquities of this kind extend to the southwards over the basins of Ubsa Nor, Atchit Nor, and Uriur Nor, towards Kobdo and Uliassutai, and as far as the ancient Karakorum. All these inscriptions are apparently old Turkish.

But there are also traces of an older race than the Uigurs, extending all over the northern part of this region. The complete collections dug up near Minnusinsk and preserved in the museum there, give a wonderful representation of art in the Bronze and Iron ages. Skulls of pre-historic man have been found in some of the grave mounds. It is said that these inhabitants of the Minnusinsk region, who, by the way, were skilled workers in metals and good agriculturists, were the origin of the Samoyedes and Uriankhai. There is evidence to show that the whole of the black-soil region of southern Siberia was occupied by pre-historic man.

After spending some time amongst the Uriankhai of the Chedan valley, and mapping the river of that name up to its source under the crests of the Tannu-ola, we passed out of the basin, over the watershed,

into Mongolia proper. The contrast was surprising, the Tannu-ola being the actual watershed between Arctic drainage and the inland self-contained basins of northern Mongolia. From the summits of this range we gazed back into dark, stormy Siberia, where forests covered the majority of the landscape. Before us lay the pale steppes of Inner Asia, giving an impression of light, aridity, and unrest. The Tannu-ola, like the Syansk, was a range of no great altitude. We crossed it by the Borashay pass at a height of 6854 feet. Summits, all of them peculiarly flat topped, rose to 7500 feet on either hand. Forests climbed up their northern sides, but the southern slopes were barren. Here, in fact, we reached the true Mongolian plateau.

Passing to the south-west in the month of August, we sighted a high glaciated mountain mass, which attracted our attention on account of the remarkable beauty of its summits and the great amount of snow and ice that covered them. The maps of this region being very poor in detail, we carefully surveyed the western declivities of the range, and filled in the features between there and Achit-Nor. The Turgun or Kundelun range is the headquarters of the Durbet Dalai Khan, one of the many hereditary ruling Mongol chiefs, and his tribe.* In this very beautiful plateau land we found the Mongols living in great numbers, apparently well-to-do and with ample good land at their disposal. The main valley, the Kundilun, was the summer headquarters of the tribe. Here in a well-watered meadow were the yurts of the Dalai Khan (or great chief), and close by was a religious settlement, with its kurins, temples, lamaseries, and a few houses belonging to Chinese traders.

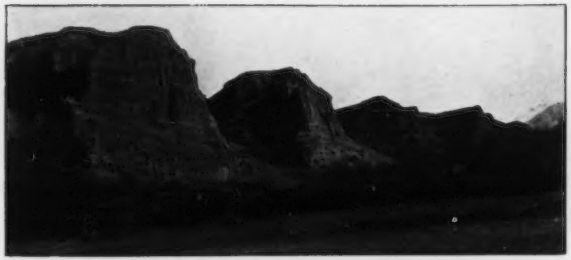
During our journey, again and again there came up the question of the decrease, deterioration, and fall of the once-powerful Mongols. There seems to be no cause for this decadence but *religion*. We may almost say that had the Mongols embraced Islam they would have risen in the scale rather than have lowered themselves. Islam is known to be an equalizing force. Buddhism, on the other hand, invariably places the people under the absolute power of the lamas. The one conduces to equality and democracy, whilst the other tends to create a lack of individuality and a return to servitude. Perhaps it was this knowledge that kept the Kalmuk chiefs from embracing Islam, for they realized it would be the end of their power. Huc, in his 'Travels in Tartary,' hints that the Chinese patronize Lamaism, endow the monasteries, and grant privileges to the lamas with the knowledge that so long as they have influence over the sacerdotal class, neither the people nor their chief will give any trouble. Their religion, as it is, debases them. Lamaism tends to decrease the population, to weaken the family ties, and to lessen the chances of

* There does not appear to be any definite name for this group of mountains, as a whole. Potanin gives Turgun for the northern summits and Kharkir for the southern. Kundelun or Kundelen is the name of a principal valley, which is the summer residence of the Dalai Khan, and owns a large lamaserie, called Kunde-kurin.

WOMAN OF THE KHALKA TRIBE.

URIANKHAI TYPE.

THE BAR-KUL RANGE FROM THE NORTH (SUMMITS AVERAGING 12,000 FEET IN ALTITUDE).



RIVER TERRACES AT NARIN, SOUTH SIDE OF KARLIK TAGH.

LAKE CHAPSA, UPPER YENISEI BASIN.

economy and the increase of their herds. It also promotes immorality; hence disease, small families, and a weak type. But we liked the Mongol, from what we saw of him. Rough but very good-natured, timid and credulous as a child, yet a man amongst men when the dangers and hardships of the steppe are to be faced. He is the antithesis of the lethargic Turki races of Chinese Turkestan. Sturdy men, some of these Mongol cavaliers; one can well understand the terror that their hosts once struck into European hearts. Short but thickset, with most determined faces, and of an untiring energy when necessity forces action, but at other times unaccountably lazy.

It would be easy here to diverge into the realms of romance, and to theorize as to the *cause* of the great Mongol movements which terrorized the world early in the twelfth century. We could scarcely travel through this, their original home, wander amongst their black encampments, and ride all day with these children of Jenghis, without wondering as to what subtle force it was that drove them with such irresisible fury out towards the east. In these days of careful search, it is highly desirable that some scientific reason should be set forth for such world-wide movements as these. But it seems to be outside the scope of the present paper. There is too much to record, and it embraces so many different topics that I fear to embark on a subject which, besides not being in itself strictly geographical, is also not quite in keeping with this broad survey of the whole region.*

By the Mongol khans we were treated with the greatest respect and hospitality. Many an impressive and instructive interview had we with these chiefs, whose way of living and view of life must be very like those of the barons of England in the early ages. The chiefs possessed that inexpressible look of *breed* which marked a great social gap between them and their serfs. They gave us relays of horses and men to transport us from place to place; we were handed on from one local chief to another right across Mongolia, free of charge. Not that they wanted money, for they had no use for it, but chunks of brick tea delighted the hearts of those hardy nomads.

Our survey of the Turgun ranges was carried on by plane-table and prismatic compass. The remarkable beauty of this almost isolated highland, its Alpine valleys, forests of pine and larch, and high pastures, tenanted by the herds of yaks, leading up to glaciers and snowfields, attracted us more than anything else we saw in Mongolia. From its heights we gazed out over limitless expanse, across the basin of Ubsa Nor, a shining sea of turquoise in an ochreous steppe; across Urior Nor to the north-north-west, and over Achit Nor, which drains to the Kobdo river and finally to its home of evaporation, the depression of Kirghiz Nor.

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* I hope at some future date to be able to lay before the Research Department the results of my researches into the *cause* of the great Mongol migrations.

Three separate self-contained basins at a glance! Although we speak of the glaciation and heavy snowfall on the Turgun mountains, it must not be supposed that the summits are of any remarkable altitude. We ascertained their heights by hypsometer and clinometer, and found none to reach above 13,350 feet. The glaciers extended down to 9550 feet, and in all cases they were in a state of retreat. Old moraines were to be seen one mile below the present snouts of the glaciers. The comparatively heavy precipitation is accounted for by the position of the range on the edge of a plateau overlooking the low depression of Ubsa Nor. In mid-summer we noticed that the range was constantly covered in clouds and mist—those great conservators of snow and ice. Consequently the heavy winter snowfall is preserved, and the glaciers, more or less, hold their own.* Wonderful pasturages cover the plateaus of the south-western part of the range, which were totally uninhabited, and, so far as we could ascertain, were never used. This is but one example of available land—untenanted. It cannot be said that the present state of the Mongols is due to lack of grazing country or climatic change.

The Turgun mountains supplied us with much of interest from the zoological point of view. Collections were kept up during the whole journey. In these mountains we first met with the *Ovis ammon* and the Altai snow-cock. Jolly little picas or tail-less hares (*Ochotona pricei*, sp. n.) swarmed in the rocky screes at an altitude of 8000 feet, and that magnificent polecat (*Mustela eversmanni*) was obtained on the Yamatu plateau. This region forms the northern limit of the yak, which we found in peculiarly isolated localities throughout our journey, namely, here, and in the Karlik Tagh, nearly 500 miles further south, until we came to its true habitat in Tibet.

Outer Mongolia is so vast and its different portions come under such varied climatic conditions that consequently its scenery is very contrastive. There are great delusions as to Mongolia. It is generally supposed to be arid and barren. Even Sir Francis Younghusband, who traversed it from east to west, along a line to the south of our route, never saw a tree in Mongolia, and was amazed at our descriptions of the forests to the north. Broadly speaking, Mongolia can be divided into four zones. The first or northern zone is that which comes under the influence of the Siberian climate. Here we have forests of larch and spruce, luxuriant meadows, and a great wealth of flowers, but on the other hand a comparatively scanty population—the ancient "wild Uriankhai," or forest dwellers. This zone stretches from the Altai along the north side of the Tannu-ola to the north of Uliassutai and Urga. South of this is the second zone, that of pastures. This is confined to the country below the forests and

* Potanin records the meteorology during twenty-three days between June 27 and July 19, on the east side of the Turgun mountains. Out of twenty-three days, seven were fine or clouded, and sixteen were wet. There were eleven thunder-storms, and twice it hailed.

along the foothills. Further south still comes zone three, the true Gobi, which remains unutilized by man, except in the spring months. This desert zone occupies only one quarter of the whole of Mongolia. The Gobi stretches southwards until we come to Southern Mongolia, zone four. Here again Mongolia comes under the influence of the Pacific, and the result is a pasture land well named by the Chinese the "Land of high grass."

The region through which our route lay, between the Tannu-ola and Altai, was all plateau-land, averaging 5000 feet. Depressions and lake-beds drop 1500 feet. It is all good pasture land, and gets a considerable amount of summer rain. Consequently the Mongols of the Durbet tribe abound, but anywhere to the south of our route aridity begins to show itself, hills become drier, and the lowlands are desert. In the last week of August we descended to the basin of Achit-Nor, and Mr. Price visited the depression of Uriur Nor to the north. There he collected interesting data, which has a bearing upon the study of the ancient climate and inhabitants. Uriur Nor showed old strands up to 30 feet above the present water-level, and although it is surrounded by high mountains on the north and north-west, at a distance of from 5 to 10 miles, yet no streams reach the lake above ground. The water is fresh and full of fish, a fact which attracts great numbers of birds. The shores of Uriur Nor are scattered with "tumuli" and carved stones, showing that once the district was inhabited, whereas at the present day no nomads use that region.

On leaving the Achit Nor our geographical work came to an end. Although it was only the end of August, we experienced most severe weather. Snowstorms and blizzards struck us, making us hurry on, for the Great Altai still lay between us and the low plain of Dzungaria. The climate of this part of Mongolia, which averages about 5000 feet in height, and is intersected and surrounded by higher mountain ranges, is one of great severity. The summer is very short and hot, whilst the winter is correspondingly cold and long. During the first part of September our camp was under snow on several occasions. Passing through the plateau land of Uigur and by the beautiful island-studded Kobo lakes, we crossed the Altai by the Urkhogaitu pass at 9711 feet. On both slopes of the Altai we came across the first Mussulman tribes—the Kirei. These interesting people, who, as Nestorian Christians, drove out the Uigurs and established themselves on the north-east side of the Altai ranges, are best known as the Keraites, whose fame spread throughout Europe in the eleventh-twelfth century, as the tribe under the direct chieftainship of the Great Khan—"Prester John." They still have a somewhat superior bearing, and are exceptionally fine men. The Kirei, the outpost of Islam in the north-east, are over 3000 miles from their Mecca, yet we found amongst them a few old men who had made the pilgrimage.

The next ten months were occupied in covering some 3000 miles in Dzungaria and its border ranges. First of all, we traversed the region

between the Altai and Chuguchak to Kulja, in the Ili valley. Roughly speaking, this route led along the frontiers of China and Russia. It took us across the valley of the Black Irtish and showed the Kirei in their winter quarters. This is the very place which Jenghis Khan made his rendezvous, and where he collected his troops before starting on his conquests westwards. Further we passed again into a Mongol reservation, the Kobuk valley, and noted the awful deterioration that has beset the Kalmuks of the Torgut tribe living here. We found large encampments of these Kalmuks already settled in their winter quarters, around the group of buildings which comprises the residence of the khan and the monastery of the lamas. These are the remnant of the tribes which at the end of the seventeenth century made that great migration westwards to the Volga. Later they made a movement which has been compared to the Exodus of the Ishmaelites. The whole tribe attempted to return to their own land. After untold sufferings, being harassed by enemies and decimated by disease, they reached Chinese territory. The remnant now exists here in the Kobuk, on the Yulduz plateau, and in the Kash and Kunguz valleys of the Tian Shan.

Arriving in Kulja just before winter came on, we halted there for two months. Great cold was experienced, the first snap during the last days of November registering a minimum of 22° Fahr. At Kulja we sent off our collections, and our party was diminished by the loss of Mr. Price, who returned through Russian Turkestan and the Caucasus to England.

In January Mr. Miller and I passed along the Chinese Imperial Highland as far as Hami and Bar-Kul, and, after working in these regions for two months, retraced our steps across Dzungaria, visiting *en route* the sacred mountain of Bogdo-ola in the south, and the Barlik, Ala-Tau, and Borotala regions in the north-west. At the end of July we arrived back at Kulja.

Dzungaria, situated as it is on the threshold of the Moslem and Buddhist worlds, in a region which has been the camping-ground for all the wild tribes which at different periods have overrun Asia, has been the prey of each successive wave of migration which has broken across these boundless steppes. It has been the home of wars and massacres on such a scale as only Asia can produce, and is in consequence a veritable "Land of Unrest." Dzungaria, *i.e.* the land of the "Zungars" or "left-hand Kalmuks," has been, in turn, invaded by the Huns and overrun by the Mongols. In the seventeenth century it was the seat of a great power—the Zungars, who suddenly rose to eminence, overran wide areas of Asia, then collapsed (like the rest), and of whom there is now nothing left but the name. In the eighteenth century (1756) the Chinese invaded it and killed off the population to a man; of six hundred thousand inhabitants not a Zungar remained. In order to repopulate the country they had devastated, the Dungans (Mohammedan Chinese) were transported

from Western China to colonize Dzungaria. Later, in the last century (1864) it was again the scene of massacres, when Islam rose against Cathay, and the Dungans killed some hundreds of thousands of Celestials. No wonder, then, that Dzungaria has not produced large cities and cultivated areas, and that her atmosphere is still one of unrest.

The land, as a whole, is a great lowland, as compared with the rest of Mongolia. Her average altitude is about 1500 feet, rising to about 4000 feet on the east, and dropping to 700 feet at the Dzungarian gate in the west, whilst the border ranges on the south rise to over 20,000 feet. Her waters run, except for a few self-contained basins, to the Balkash or the Arctic by way of the Ob-Irtish waterway. These plains are bounded on the north-east by the great Altai, and on the south by the Tian Shan, whilst they are cut off on the north from the Siberian plain by the Ala-tau, Barlik, and Sair ranges. Eastwards the steppes rise gradually and merge into the Gobi, through a narrow strait of about 130 miles, which here exists between the Altai and Tian Shan. Although thus shut in by mountains, through Dzungaria lies the open roads between China and Siberia, the only gaps in the frontier mountain wall. There are two well-marked outlets to the north for trade and transport. Between the Ala-tau and Barlik mountains lies the so-called Dzungarian Gate—a narrow trench of 10 miles in width, between the mountain walls on either hand. Further to the east lies the Black Irtish, which drains the south Altai to the far Arctic ocean.

These regions of Dzungaria are now fairly well mapped. New ground alone remains on the south-eastern border ranges—the Bogdo-ola, Bar-Kul, and Karlik Tagh. Although we traversed over some 3000 miles of country, on plain and mountain, we actually made addition to the map only in the extreme south-east. Here our work joined in with the survey made by Dr. Aurel Stein and his assistant, R. B. Lal Singh, and with the maps of Potanin and Kozlof, made respectively in 1876–77 and 1895.

A certain amount has been written and much conjectured as to the probability of the "overlapping" of the Altai and Tian Shan mountain systems in the ranges of Barkul and Hami. These ranges, which form the eastern extension of the Tian Shan, under the name of the Bar-Kul and Karlik Tagh mountain, obviously belong, orographically, to the Tian Shan. Yet when we come to examine their flora and fauna, we find a similarity between them and the Altai. After a continuous stretch of 1300 miles, from Tashkent to Guchen, the extensive Tian-shan system drops its crest and lays itself out into a rolling plateau. It was on reaching this area that Miller and I, in February, 1911, first started our work of surveying what was to include the entire group of the Bar-Kul and Karlik Tagh mountains.

We had travelled along the weary Pe-lu or northern high-road, which runs the length of the Tian Shan on the Dzungarian side, a trek of no enjoyment and much discomfort, experienced as it was in mid-winter.

We had passed in succession Manas, Urumchi, and Guchen, Chinese towns of some importance. At Guchen we reached the limits of the exhaustive exploration carried out by Prof. Merzbacher in the ranges to the south. Consequently we started our survey and carried them eastwards to the limits of the mountains and to the edge of the Great Gobi.

A word as to our forerunners in these regions. In 1875 the Russians, Sossnowsky and Matoussowsky, passed across the ranges from Hami to Bar-Kul, and thence to Guchen, whilst on a journey from China to Siberia. Later the well-known pioneer Potanin visited Hami, and gave us the first idea of the geography of this district. The naturalists Groum-Grjimailo, in 1889–91, recorded their ideas of the orography of this extremity of the Tian Shan. And, lastly, Kosloff gave us, as a result of his journey in 1893–95, the most recent maps of Karlik Tagh as a whole. In 1887 Sir Francis Younghusband, in the course of a trans-continental journey from Pekin to India, came down to the Karlik Tagh from the north-east, and crossed the passes to Hami. In the same year Col. Mark Bell reached Hami from the south, and passing through Bar-Kul on his way to Urumchi was the only Englishman in advance of us to visit that town. He is the only Englishman to give us any account of this region.* Quite recently (1907) Dr. Stein's surveyor skirted the south side of the ranges to the north of Hami, and on to his maps we have worked in our own surveys. The material we collected on our journey has enabled us to bring out a detailed map of the whole region. We have not only endeavoured to show the exact land relief, but also the style of country, the cultivated areas, pasturages, forests, and population. We have also been able to draw lines of demarcation where we suppose the limits of the Altai flora and fauna to be located.

On March 1, 1911, we crossed from the Pe-lu, the northern high-road, to the Nan-lu, on the southern side of the Tian Shan. The route took us across the above-mentioned plateau, where the Bogdo-olu mountains merge into the Bar-Kul range. It was winter, and snow lay deep in places. The plateau reached 5000 feet at the pass, but there were summits which reached to 8000 feet. On dropping down into the southern side, of course, we entered a warmer and dryer clime. Here the landscape was marked by excessive desiccation. It was in the small isolated basin of Chi-ku-ching that, for the first time in our journey across Asia, we really met with those most marked signs of a changing climate, namely, dead and dying poplar forests and tamarisk mounds of a great height.

A few days later we sighted the oasis of Hami and Kumul, and got our first view of the extensive snow-capped summits of the Karlik Tagh. This solitary group of snow-capped mountains, with peculiar table-topped summits on the west and with lofty tooth-like pinnacles and jagged peaks

* Since writing this paper, Dr. Aurel Stein's volumes, 'Ruins on Desert Cathay,' have been published, in which he gives an account of his visit to Toruk and Ara'tam on the southern edge of the Karlik Tagh.

on the east, broken with well-worn razor-edged edges, splintered precipices, and deep-cut valleys, formed a strange contrast to the smooth stretches of Gobi below. An isolated group of snow-pinnacles tossed to a height of 14,000 feet, standing sentinel on the western edge of the Shamo. Such was our first impression of the Karlik Tagh—that far-removed and little-known mountain mass, where men live almost hermit-like lives, cut off from the outside world, separated even from those centres of human life that one finds dotted here and there over the immense wastes of Central Asia and Mongolia.

It was early spring when we first sighted the Karlik Tagh, and the abundant snow that lay over the high flat summits and spread themselves out into smooth wave-like fields, gave an enchantment to the somewhat barren plains of dust and stone that led up to the little oasis of Kumul. On a clear day the view from Hami is inspiring. Southwards stretch the yellow deserts to the fabulous Lake Toli, and still further away to China proper. Northwards rises the snow-ridge of the Bar-Kul range, linking up with the Karlik Tagh, which runs eastwards till lost to sight. A few fine summits rise from the centre of the Karlik Tagh, and at this date the snow-fields were very extensive on the plateau-like tops of the western end. Around us lay the little oasis and town of Kumul, with its walled Chinese city, its bazaars and gardens. Further to the south lay the native Turki town, above which rose, from a commanding position, the great mud palace of the khan or "Wang"—hereditary prince of the Kumuliks, Tsiang Wang,—or prince of the first rank.

Kumul itself lies in a salt-encrusted plain, below the snowy crests of the Karlik Tagh, a veritable Garden of Eden in the midst of a howling wilderness. The water from the mountain torrents, sinking below the surface in the Piedmont slopes, on reaching the open plain, appears again at Kumul in the form of copious springs, which ooze up and form the irrigation supply of the oasis. The zone of cultivation and the inhabited area is very small, and only extends for about 7 miles north and south, and 5 miles east and west, but such is the richness of the soil, and with such care is the ground terraced and watered, that it supports a large Turki and Chinese population. In the centre lies the town of Kumul, remnant of an ancient Mussulman kingdom, and the most eastern stronghold of Islam. Close beside, is the walled Chinese town, to whose Emperor the Prince of Kumul has held allegiance for 200 years. The native inhabitants are of Turki stock, descendant of the old Uigur peoples, now distinguished as Taranchi, Chanto or, more exactly, Kumuliks.

Long ago (1513) Kumul was an integral part of the Uigur Khanate of Turfan, but in 1669 it became Chinese. During the Dungan rebellion the oasis suffered much at the hands of the Mohammedan destroyers (for the Turki and Chinese Mohammedans fell out amongst themselves), but since the re-establishment of Chinese rule it has recovered its prosperity. Kumul presents many interesting studies. The strange mixture of Islam

and Buddhism, Turki and Chinese, gives rise to many peculiarities and customs, whilst the position the oasis holds on the main route between east and west makes it a refuge for desert-worn caravans. It has some importance also from the point of view of trade and transport, between China proper and Sinkiang, the new dominion. In point of fact, Kumul is the capital of a protected native state and the residence of its khan. The Mussulman town itself, and the scattered hamlets situated round the Karlik Tagh, together with several villages on the south side of the Bar-Kul range—as far west as Lodun, all owe allegiance to the khan. It would be difficult to give an estimate of the population. We have a knowledge of thirty villages under the khan, which supply a total of about 1000 or 1200 houses. Kozloff gives the population of the Taghliks or mountaineers at 500 families.

The khan resides in a somewhat quaint structure, a mixture of Chinese and Turki architecture, where he keeps up considerable state. As a vassal of the Emperor of China he visits Pekin every sixth year, where he acts as personal servant to the Emperor for forty days, as a sign of his allegiance. Treated with respect and honour by the Chinese, in acceptance of 2000 saires a year, besides twenty-five bales of silk, etc., with his people in comparative serfdom, he has a pretty good time of it, and is presumably very wealthy. He has, in fact, the status of a mediæval English baron, and lives in a somewhat similar style. From what we could gather, the prince appeared to be more feared than liked, and he was by no means popular. We noticed general discontent amongst his subjects, even here in this back corner of the world there was a desire for freedom from an autocratic rule. His subjects were eager to become directly under Chinese rule, being already Chinese in everything but name and religion; but they have neither the initiative nor the enterprise to make a step in this direction. The man that has "ideas" is exiled, and we met many such in the outlying villages at the furthest corners of his dominion. We found, too, that all the hunters had been deprived of their guns, forfeited because of an attempted rebellion last year. If Kumul was nearer the Russian frontier, she would no doubt desire Russian protection, in the same way as at the present moment the Mongols and the Kalmuks of Western Dzungaria are endeavouring to escape the yoke of China. The khan owns much private land and great flocks of sheep. The land is tilled, sown, and harvested, and herds are cared for by forced labour.

The Wang, however, treated us with all kindness and honour. The English, he said, were friends of Islam, and he was always glad to meet them. Hindustan he knew of, and, being a Mussulman of the strictest type, he appreciated the foreign rulers who respected the religion of their subjects. The fact of this extremely strict Mussulman community situated at the very end of the Islamic world, and yet completely under Chinese influence, is indeed a paradox. Herein lies the chief peculiarity of Kumul.

It is cut off from any other stronghold of Islam, and outside the sphere of influence that might go to keep its religion pure. Few Mohammedan strangers pass through it, and it is situated amongst Buddhists and Chinese, without a faith. Moreover, it has been so influenced by Chinese elements during the last two hundred years as to have adopted its dress, to speak its language, and even in many cases to eat Chinese food. Yet, in spite of this, the Kumuliks present a type of Mohammedan people that it would be hard to beat for strictness and the exact keeping of the letter of the law. This, no doubt, is partly due to the khan's eagerness to keep his people from becoming contaminated by the Chinese, realizing that by this he would lose his hold over his subjects. So he strictly enforces the tenets of the Mussulman faith; men have to pray whether they like it or not, and for offenders large whips are kept hung in the courtyard of the castle, and used without mercy. The drinking of spirits is forbidden, and morality is a feature. A strange antithesis—indeed, a moral town in Chinese Turkestan.

The prince lived in a Chinese house, he gave us a Chinese dinner, he and all his servants were in Chinese dress and wore mock pigtails. On the other hand, he would scarcely drink from a bottle of spirits he opened in our honour, and went out halfway through the dinner to pray at the mosque.

We found the Turki town to be a rabbit-warren of a place between high mud walls. It presented a harvest of pictures to the artist, with its narrow alleys, overshadowed by fine old trees, its little mosques, and groups of gaudily dressed women. The latter we stalked with our cameras without much success. Shy as rabbits, they dived into their houses when they saw us approaching, and even locked the doors until we were well past. Overlooking the town is the pile of buildings making up the khan's residence, picturesque in its possession of several storeys, high walls, great gateways, and a paved road leading up to it. Here in Eastern luxury lived the khan, surrounded by his retainers and courtiers, with stables for his horses, mews for his falcons, and a high three-storied harem for his womenfolk. Around the palace was spread a garden of extraordinary luxuriance. Here amongst orchards and flower gardens were built miniature temples and summer-houses, even a shooting-range found a place, where the archers might practise. There was an artificial lake, where, on an island in the midst of iris beds and under the shadow of great trees, was planted a cool pavilion. The garden of the Khan of Kumul was a paradise, scarcely excelled outside the 'Arabian Nights.'

The water which drains southwards from Karlik Tagh is for the most part lost below the surface of the ground after leaving the mountain. No existing maps give a true idea of the drainage. Blue rivers, flowing strongly out into the waste where they form lakes (kul), are common errors of the maps. As a matter of fact, what water escapes use for

irrigating purposes disappears below the surface of the ground. In a few cases it reappears as small springs in some depression in the desert, when there is a sufficient supply from the mountains to feed them.

The river that creates Hami, for instance, disappears a mile from the point where it leaves the rugged granite foothills of the Karlik Tagh; 18 miles further on five large springs appear in what was once its river-bed. This water is used for irrigating the oasis. Twenty miles below Kumul the water is bad and too salt for irrigation. Beyond this there is no continuous flow of water. In summer when the snow melts in the ranges there may be a continuous flow above ground to the lakes, as marked in the Russian maps as existing to the west. But this would only be for a short period. I think these lakes are merely formed by springs of varying abundance.

The illusive problem of Lake Toli, that imaginary patch of blue in the north-eastern deserts of Chinese Turkestan, has long attracted my attention. From information I gathered, my explanation of the so-called lake is as follows:—

The Kumuliks have a somewhat different rendering for the Turki words relating to water, and the words they use for springs, lakes, rivers, etc., are of some importance. Theirs is a very exact interpretation. A river is only a "daria" for a short time in spring, when the watercourses are full. They only speak of "daria" when the melted snows from the mountains come in high flood across the plains. The remainder of the year the water-supply is called "bulak" (spring). Any ordinary water-supply is called "bulak," even good-sized streams used for irrigation purposes are "bulak," because they originate from springs and are not continuous from the snows. This is, of course, exactly the character of Karlik Tagh rivers.

Now, a large group of strong springs is invariably called "kul," a word like "Nor" being generally used to denote a lake or large sheet of water. There is Iti kul near Togucha, Shona Nor at the end of the Hami river, and Toli kul in the desert to the south. I believe this caused the early explorers to locate lakes, by hearsay, in a region where only springs really existed. It is not too much to suppose that Toli kul is, in reality, a depression in which, if there was water enough, there would be a lake. But as a matter of fact there is only a meagre supply of water issuing from underground, the remnant of the Karlik Tagh drainage. It is never sufficient in itself to form a lake; nevertheless, according to the Kumulik idea, it is a "kul." No doubt, once there was a lake. An old trade route led thence from Hami, and on across what is the most inhospitable desert, to join the great trade route that runs between Su Chow and Lop Nor.

By command of the khan, men and horses were provided for us, and such orders were given as would enable us to travel at our pleasure and see the whole of his territory. Relays of horses took us wherever our work led us, whilst our heavy baggage went by cart, along the plain at the

foot of the mountains. In this manner we traversed the whole of the Karlik Tagh, until leaving the territory of the Wang at Bar-Kul. By penetrating to its uppermost valleys and clambering transversely (with no small amount of difficulty) over its granite ranges, we made maps and got a rare insight into the conditions of life in this insular mountain mass.

North of Hami and at a distance of 20 miles lies the Bar-Kul range, running west and east, in a narrow even ridge. Due north of the town, where this range merges into the Karlik Tagh, there are cols of about 8000 feet altitude, over which tracks lead to the town of Bar-Kul. Eastwards of this lies a peculiar block-shaped range of flat-topped ridges and deep-cut ravines, which gradually breaks up and falls off into excessively rough country in the extreme east.

A peculiar feature is the outlying range of granite, which makes travelling exceedingly laborious, and which confines the native population and their cultivatable area to secluded valleys between the outlying granite and the main range. In fact, the rivers invariably pass through this granite wall by deep-cut ravines, and the lower valleys give no access to the upper. The valley of the Bardash, situated in the central portion of the range, is typical of the whole southern side, and I may as well give my impressions of the contrastive features of the country as they came to me. Leaving the plain, we faced the abrupt wall of outlying granite that forms the first foothills. For some hours we toiled painfully over barren, red ridges, destitute of everything but thorn scrub. The river-valley itself was not negotiable; the stream wound through a steep side ravine, which allowed no space for a track. Occasionally from the crest of a ridge we got a view of some peaks ahead, and of the immeasurable desert that lay below and behind us. But later we dropped down into the main valley, and after passing through thickets of rose and willow, under gigantic elms, poplars, and walnuts, we came to where the valley floor was wide and open, and men had room to cultivate.

In these secluded upper valleys the "Taghliks," or "mountaineers," live a peaceful existence. Most valleys support but one village, generally situated, as Bardash is, at the back of the granite range. Only in the Narin valley, where the rivers unite before breaking through the outer range, is there a considerable group of villages. Very often we came across isolated groups of three or four farms located in some place where the nature of the country allowed a small area of cultivation. Every available patch of ground was made use of, and I do not believe there is a spare acre on the mountains. With an increasing population, the available land does not increase, and since the khan forbids emigration, there is "overcrowding" in the pleasant valleys of the Snowy mountains.

After the impoverished aspect of the plains these high valleys seemed pleasant enough. We rode through fields which had been cleared—with infinite labour—of rocks. Chukor and brown partridges called from the

rocks above, and small boys, herding the flocks of goats, sang more joyous songs in their mountain home than their confrères of the melancholy plains. Pleasantly situated, too, were their houses of stone and mud, which are as often as not perched on the rocks so as to avoid wasting the land capable of cultivation. In no less a degree did the people attract us. They were essentially "mountain-folk," and we could trace their likeness to the Tajik mountaineers of Bokhara and Hunsa, rather than to the lethargic Chantos of the Turkestan plains. Their life, too, is harder. Only small patches of ground are available for cultivation, and these have to be cleared of rocks before ploughing is possible. The men were well made, clad in half-Chinese, half-Turki costumes, and wearing mocassins over thick felt stockings. The women, too, were freer here than their friends "in town," and behaved with a natural inquisitiveness and freedom which was denied to the Kumulik ladies. Bardash was, in old days, a summer resort of the reigning khan. His "shooting-box," a show-place to visitors like ourselves, is built in Chinese style in a beautiful orchard of fruit trees, and surrounded by some fine walnuts. But it has fallen into disrepair, for the present khan is too old to accomplish the journey to this mountain village.

The valley of Bardash is isolated, and in order to reach another, one must needs toil over rough transverse ridges for a day's journey. We followed most of these valleys up to their sources, which in all cases rose in glaciers of varying sizes. The Bardash valley, which drains from the highest peaks, held a glacier of about a mile and a half in length, and showed old moraines for a distance of 5 to 6 miles below the present snout of the glacier, which reach to within 3 miles of the village of Bagdash.

From summits of 12,000 and 13,000 feet at the eastern end of the range we got views which repaid us for the extraordinarily rough climbing that this entailed. At these points of vantage, within sight of herds of ibex and the call of snowcock, we could look out over the whole of desert Cathay, and it was easy to grasp the essential features of the land to the east and south. We noted the peculiar table-like tops of the western portion of the range, and the excessively steep and broken country at the east end, with its razor-backed ridges and V-shaped valleys. We gazed out over the ocean-like desert that washes up to the very foothills of this insular mountain mass. On a clear day in winter or early spring, before the summer heat-haze begins to hide the distance, and when no south wind with its complement of "loess" darkens the air, you may stand aloft on some pinnacle of the Karlik-Tagh and gaze, till the eyes ache, over immeasurable distance. You can search the southern deserts, where yellow flats reach unending to a far horizon, only broken here and there by pyramidal hills of carmine and yellow ochre. Eastwards the gaze is mystified by the regions of colour that are shown by the succeeding ranges of desert hills, as they pass from yellow to dun, and to purples, till they reach the softest ultramarine, and fade into distance at 100-miles range. Still one has surveyed but half the panorama. Northwards alone is the horizon

broken by far-distant snow ranges—the great Altai. These stand up superbly, and their height is intensified by the desert gap in between. There wander the nomad Mongols—a different world altogether to this settled region of Chanto farm and Kumulik hamlet.

Though narrow, deep-cut valleys open up beautiful vistas of larch and pine forest; for, curiously enough, the extreme eastern end attracts, for some reason, a considerable rainfall, and the valleys are well forested. Settlements of Kumuliks are here few and far between. A few, such as at Bai and Nom, exist, as the last examples of sedentary life on the edge of the great waste of Gobi, or the Nomad's land of Mongolia. Within our view we held the limits of four different Asiatic peoples. On the north ranged the Kirei Kasak and the Mongol hordes, whose territory we could just discern. Eastwards, across an intervening zone of uninhabited desert, rose the isolated Ati-bogdo range, the summer quarters of Torgut Mongols from the Edsin-gol lake, in the very heart of the Gobi. Southwards stretched the interminable desert to the Hoang Ho and the gates of China proper; and over it comes the ceaseless, plodding bands of tenacious Chinese.

The region between Karlik Tagh, Ain-si, and Su-chow is highland; it averages over 5000 feet in altitude, and supports Chinese settlers in small isolated communities. They come right up to the border of the territory of the Khan of Kumul, and at one place, Tash Bulak, they have supplanted the Kumuliks.

The northern side of Karlik Tagh differs from the southern, in that it is a fine pasture land. On the north the snowfields run down to a rolling plateau of about 10,000 feet, and this leads down at a gentle grade to the desert below. From 10,000 feet down to 7000 feet extends fine upland pastures covered with rich grass, which compare strongly with the barren, desiccated rock area of the southern slopes. Here, in consequence, the Taghliks have adopted a semi-nomadic existence and live chiefly in yurts, of the ordinary type. But the movable tents presented a half-fixed appearance, for there were kraals for the herds built close by, and, as often as not, a hedge of scrub and grass for protection from the wind. Now and then we came across great flocks of sheep, which we found in most cases belonged to the khan. But the accessibilities of these open grazing grounds hinders them from being reserved as private pastures for subjects of the khan; in consequence, Chinese herdsmen from Bar-Kul use them considerably.

The scenery here is varied by the presence of two lake-basins, namely, Tur-Kul and Bar-Kul. The former is a small upland basin at an altitude of 5800 feet, bordered by high ranges on the north and south, but apparently once draining through on the west to Bar-Kul. The lake is exceedingly salt, but excellent pastures border it where the ground is wet and boggy.* We chanced to be there during a spell of bad stormy

* An analysis of water from the lagoons of Tur-Kul shows that it contains 34 per cent. salt. For comparison, I might mention that the water of the Dead sea contains 25 per cent. The water of Bar-Kul contains 3 per cent.

weather, and the lake was alive with myriads of wildfowl, which had sought refuge there from the more exposed waters of Bar-Kul.

The wide plateau basin of Bar-Kul is, however, the real feature of the northern steppes. I shall not forget my first impression. A wild sunset hung over the forested Bar-Kul range; the grassy steppe was dotted with cattle, herds of horses, and the black yurts of the shepherds; small farmsteads gave an air of settlement. Northwards arose the height of Mechin-ola, flat topped and rough sided. It was an animated scene for Central Asia; it was as if one had at last found an Eldorado, free from the blight of desiccation. The largest forest we saw existed here on the northern slopes of the Bar-Kul ridge, the pleasantest temperature warmed us after the cold of the bleak plateaus, and the finest horses ran half wild in great droves over the prairies. Besides the black yurts of the shepherds, there was a considerable element of sedentary life. Chinese colonists had here taken up large areas of land for corn growing.

In connection with the adjacent pasturages and cornlands Bar-Kul itself is an important centre. Situated close under the mountains, where spruce forests abound and where melting snows perennially saturate the surrounding country and keep the pastures fresh and green throughout the summer's heat, it forms the centre of trade for the surrounding country. Here come the Kumulik shepherds and the Chinese farmers, who find in the bazaars what little they need in the way of food-stuffs and clothing. You may here meet Kalkas from the northern Gobi, caravaners from far Cathay, and Chanto merchants from the great oasis of Eastern Turkestan. But Bar-Kul does not possess a good reputation, in spite of its numerous places of worship (there are said to be from eighty to one hundred), and this in a town of but about five thousand inhabitants. Its bad reputation has had, I expect, something to do with it having been avoided by so many travellers. Prjevalsky passed close by, but did not enter; Atkinson approached from the north within sight, and then swung back again into the desert; Younghusband passed it to the east and went on to Hami. We were even told that the caravans from Koto-Koto, on the banks of the Yellow river, used to include Bar-Kul in their itinerary, but now they go direct to Guchen by the desert route, in preference to risking trouble at Bar-Kul. This, in a region where towns and bazaars are so scarce, is remarkable.

The feature, *par excellence*, of Bar-Kul is its horses. We had always been puzzled as to the kind of animal which had given the name to "Bar-Kul," or "Wild animal lake." Certainly, its neighbourhood possesses abundant animal and bird life. We saw wildfowl innumerable on the lake, and its western shore is the haunt of troops of gazelle and droves of wild asses. But, we think, the real "wild beasts" of the Bar-Kul basin are the great herds of unridable horses—the broncos which run half wild over the surrounding steppes. To the number of fifteen thousand these horses form an Imperial stud, the pick of which are taken every year to Pekin.

Although Bar-Kul has only been founded about two hundred years, yet it possesses some antiquities of very great interest. The black stone called Tzin-Chen-Bei, for instance, which we took squeezes of, has a reputation throughout China. It records the victories of a Chinese (Mongol?) general, and is preserved with care in the precincts of a temple.*

On leaving the Bar-Kul we journeyed again in the deserts of the south-western portion of Dzungaria, and from our studies of the fauna of these regions and the Karlik Tagh we have mapped out the various distributions of the different species of mammals, both large and small. As a result, we find this particular district is a sort of neutral ground between different well-marked zoological areas. Species, typical of Siberia, Mongolia, and Turkestan, here meet and overlap. The Saiga of the steppes of Russia and West Siberia ranges up to the edge of the Mongolian plateau, just north-west of Bar-Kul. The wild horse of Mongolia meets the range of the Saiga. The wild sheep of the Karlik Tagh is of a species peculiar to the Tian Shan, and it is the same case with the wapiti, ibex, roe-deer, snow-cock, and partridge. Across the gap of 130 miles these species can see the haunts in the Altai of their cousins of a slightly different variety. The presence of larch forest give the Karlik Tagh the aspect of Altai scenery, and the existence of numerous little picas, or tail-less hares, and mole-rats (*Ellobius*) of species closely allied to those of the Altai system, show the affinities that this range has to the Altai. But there is a limitation to this in a hard-and-fast line across the Chi-Ku-Ching plateau, which defines the end of the neutral zone and the beginning of the Tian Shan flora and fauna.

In retracing our steps westwards from Bar-Kul we traversed again the whole length of southern Dzungaria. Being spring, the country presented a very different appearance to what it did in midwinter. Flowers now

* The Bar-Kul basin is the possessor of one remarkable physical feature, which amounts almost to a phenomenon. It should be understood that the entire floor of the basin is more or less saturated with water, and in consequence cultivation is possible. Nowhere does it present features such as sand-desert or tamarisk mounds, which exist in any other part of Dzungaria and Chinese Turkestan. It is an upland basin into which is drained a considerable amount of water every year, chiefly from the snow-clad ranges on the south. It does not present the appearance of a desiccated area. Yet at the extreme eastern end of the basin, isolated between the gaps that lead to Tur-Kul and over to Hami, there is a remarkable group of *sand-dunes*. They cover only a small area of 5 or 6 square miles, but attain a great height.

Neither in the sand-areas of Dzungaria nor in Chinese Turkestan, nor even in the great sand-belt of Transcaspia have we seen dunes of the height of these. Mr. Miller, who spent some time in the dunes, reckoned the maximum height to be 400 feet. The dunes were very curiously formed; a profile of their summits showed a sharp angle instead of having the long-back windward side and sharp drop-off in the leeward. In the centre of the dunes was a regular "falj," or circular pit, which went down to the floor of the plateau, and supported vegetation in the shape of grass and scrub. Here, according to native report, is a sand-buried Mongol village. At nights, they say, can be heard the crowing of cocks and the lowing of cattle.

carpeted the steppe in place of unbroken snowfields. And the country, which in January had seemed to be lifeless, appeared now the home of thriving colonists, and showed as well signs of much undeveloped land. In choosing Dzungaria as the locality for the Government centre of all the New Dominion, the Chinese did well. Here alone was there ample room for settlers, and considerable areas fit for colonization. The numerous rivers which flow northwards from the Tian Shan and lose themselves in the sands of Central Dzungaria, were all running to waste. In spite of the large importation of Dungan immigrants, there is still ample room. Yearly there is quite an influx of Chinese to Dzungaria and the Ili valley. Chantos, too, come over from Chinese Turkestan, where all available land has for long been taken up, and taxed to the limits of its capabilities.

Southern Dzungaria, then, assumes the appearance of a new colony. Of towns there is Urumchi, the capital of all Sin-Kiang; Manas, the great agricultural centre; and Guchen, the terminus of overland traffic between Dzungaria and the Yellow river. Apart from these towns and other scattered villages along the Chinese Imperial high-road, there are only two other settlements. On the northern frontiers there is Chuguchak, consisting of a walled Chinese city and a good bazaar supported by Tartar, Russian, and Turki people. Far away on the southern slopes of the Altai is the new town of Tulta or Sharasumé, which the Chinese are intending to make a strong frontier post. The rest of the Dzungarian lowlands are steppe, varied by pasture-land and areas of sand-dunes, the whole sparsely populated by Kalmuk and Kazak nomads. The rivers which flow from the Tian Shan and Ala-tau are in every way like those of Chinese Turkestan. Their banks are forested with poplar and jungle, but nowhere did we find these forests suffering from desiccation to the degree in which they are found on the southern side of the mountains. The aridity which marks Chinese Turkestan does not extend to Dzungaria.

Nevertheless, we experienced considerable difficulties in an attempt to cross the plains, early in June from Manas, north-westwards, to the Barlik regions. The nature of the ground was, over large areas, a soft salt-encrusted plain of friable earth, most tedious to man and beast. Where water approached the surface, dangerously soft ground bogged the horses and made progress slow, and to travel transversely to the waterways entailed heart-breaking *détours*, to get across the deep-cut gorges which have been carved out by the streams. Sometimes without water, and at others tortured by myriads of most vicious mosquitoes, travelling by night and pretending to rest by day, we at length reached the happier pastures of the Barlik mountains, and later in the summer visited the uppermost reaches of the Borotala valley. These pleasant lands are the home of innumerable nomads. Kasaks, a branch of the Kirei clan, hold the Barlik and Jair ranges, but the whole of the Borotala we found to be a reservation for the Charkhar Mongols.

The plains of Dzungaria are of complex character. They are, for the

most part, a hard dry steppe, with scanty vegetation. This is varied by areas of sand-dunes; the largest of these sand-belts occupies an area of about 10,000 square miles, and is situated in the heart of the country. (Prjevalsky crossed its widest extent.) Saxaul and tamarisk generally cover the sand regions, and these are often a winter resort for the Kazak nomads, who use snow for drinking purposes in what is a waterless tract for the rest of the year.

Along the southern border under the Tian Shan range, one finds a zone of vegetation where the water from the mountains approaches the surface; this is generally about 20 miles from the foot of the mountains. Further away the water is lost except where it runs in such channels as the Manas river, and then it reaches out across the whole width of Dzungaria until lost by evaporation in the Telli Nor.

In the zone of vegetation are situated the Chinese, Dungan, and Taranchi settlements. Of these three, the Dungans, no doubt, possess the greatest interest, ethnographically and politically. Of the origin of these Chinese Mohammedans, who can say? Theirs has been called "the most obscure problem in Asiatic history." Some suppose them to be a remnant of the ancient Uigurs, who in early days emigrated from the north to the provinces of Kansu and Shensi, and became Chinese in everything but religion and character. Others believe that they originally came from Samarkand. There are no records of them. Suddenly we find them established in China as strongly as they are to-day. The Dungan colonies of Dzungaria date from early in the nineteenth century. Slowly these active and ambitious people got the upper hand, till at last their hatred of the Chinese led to the rebellion and massacre of 1860–70. The Dungan remains a danger in far Western China. He is just as hostile to the Chinese as ever he was. He is virile, active, and superior to the Celestials in business matters; he is capable of great things.

Once off the floor of the Dzungarian plain, there is almost always to be found a zone of pasturage. These vary in excellence according to the position of the ranges; all the northern slopes are tenanted by nomads, but the southern slopes that face the deserts are generally very barren. Above this, one can delight in forests of spruce, rippling brooks, and flower-strewn meadows, which are, as often as not, backed by the stainless snows of peaks that run up to 20,000 feet.

On the southern border ranges, the Bogdo-ola is the feature of all that part of Dzungaria. A solitary block, made up of three peaks, tossed to a height of over 17,000 feet, stands alone, and is to be seen from 100 miles distance in every direction. Prjevalsky saw it from the Altai at 160 miles, and we took bearings on to it from Ta-shi-to near the Bar-Kul range. Such a summit calls forth wonder from the superstitious natives; it is the "Olympus" of the Mongols. Close under it, in a steep-sided amphitheatre, is the sacred lake of Bogdo-olu, graphically described by a previous traveller as "the pearl of the Eastern Tian Shan." The report of the

Bogdo-ola *volcano* resulted from the Chinese myth that fire and smoke issued out of it when the gods visited it once a year!

If the northern border ranges are less inspiring, nevertheless they are excellent country for the shepherds. The Maili and Barlik are well tenanted by a powerful tribe of Kazaks, and I believe the Jair, Urkashar, and Sair are, in like manner, well populated. But the "land of promise" of all Dzungaria is without doubt the Borotala. That long upland valley, enclosed on north and south by high ranges, holds out pleasant prospects to ranchers and colonists. It is envied by all, but reserved intact for the Charkhar Mongols, to whom it was given as a special privilege. The Charkhars' presence in this far western corner of the Chinese empire is an example of that innate habit of change which is the soul, the life, and the ordinary occupation of the Asiatic nomad. We, in these days of sedentary life, narrow conventionalities, and carefully delineated frontiers, can scarcely realize the magnitude of those movements in the old days. Formerly a conqueror thought nothing of shifting a whole nation across a continent, or of colonizing the lands he had laid waste by importing bands of captives. Now the world is too cramped and confined; carefully surveyed and jealously guarded frontiers forbid such excursions as were made by the Torguts, the Eleuths, and the Charkhars. A nation or even a tribe would find considerable obstacles in its way if it started to overrun Asia.

The Charkhars were once a tribe of some account in South Mongolia, outside the Great Wall of China. Owing to their formidable numbers and warlike nature, the Chinese feared them, and at length broke their power and transported them in bulk to the furthermost western corner of the empire, and gave them the Borotala as a reservation. Here they remain, and, if I mistake not, they are better off than in South Mongolia. For those "lands of high grass" are now being rapidly overrun by Chinese colonists, to the detriment of the few nomads that remain there.

The Borotala is an exceptional region, and gets an unusual amount of summer rain. Heavy forests, which extend all along the southern slopes of the Ala-tau, prove this, as does also the fact that the nomad Kalmuks can exist in excellent pastures all through the heat of summer at the low altitude of 2000 feet. It is a fine valley, well watered and timbered, and granting every possible scope for cultivation. The Charkhars abound in large encampments along the river-banks, and even a few Chanto and Chinese farmers have found a footing, by renting the land at an exorbitant price from the chiefs. They pay fifty per cent. of their produce. The upper portion of the valley and the higher ground on the bordering ranges supported large numbers of the Kho-ching section of the tribe. These were the original settlers, those of the lower parts being new-comers — Chi-ning. We noted the superior type of the Charkhars, in comparison to the Torguts. They were almost clean-looking, possessed some fine

yurts, and appeared to be well-to-do. One is always struck by the paradox which thus presents itself, of a people at a standstill in a magnificent and pregnant land. There is land to waste in the Borotala; it would hold a far denser population, and only the fact of Chinese protection of the Mongol rights of ownership hinder the Kasaks from overrunning it. Yet the Kalmuks do not appear to increase. The Mohammedan Kazak is everywhere on the increase, and moving eastwards. There is a great flood of these nomads from the Russian territory always tending to overrun the Chinese preserves. They have done it in the Tekkes valley in the Tian Shan, and they are doing it in the Tarbogatai region. The Mohammedan is on the increase; the Buddhist must give way.

On leaving the Borotala we passed out of the region we had made it our work to study. Later in the summer we crossed the Tian Shan by the well-known Muzart pass, and descended to the plains of Chinese Turkestan. Journeying with the sole object of getting home as quickly as possible, we passed to Aksu, Kashgar, and Yarkand. In October we bade farewell to the heart of Asia for the crest of the Karakorum pass, and in due course reached Leh, Srinagar, and Bombay.*

Sir Thomas Holdich, Vice-President (before the lecture): Mr. Douglas Carruthers, who is to address us to-night, is a young gentleman who has devoted nearly the whole of his time to scientific exploration. Some six years ago he was connected with an exploration of Mount Ruwenzori in Africa. In 1908 he was with Mr. Rickmer Rickmers in an exploration in Central Asia. In 1909 he undertook a most adventurous and what I consider a most risky journey in Northern Arabia, the results of which were communicated to the Society, and for which he was awarded the Gill Memorial. More lately, during the last two years, he has been engaged with two companions—Mr. Miller and Mr. Price—in exploring a region in Central Asia which is of particular interest to us in many ways, including the upper Yenesei basin and the Altai mountains, and the results of that journey he is going to tell us to-night. I wish you particularly to note the names of his companions, Mr. Miller and Mr. Price, because Mr. Carruthers informs me that not only is he indebted very much to these gentlemen for their assistance in scientific research, but they also bore on their shoulders a great part of the responsibility of financing the expedition. I think that Mr. Carruthers needs no further introduction by me, and I will ask him to commence his paper.

Sir Thomas Holdich (after the paper): We have listened to a paper which I think I may say in many respects is a model of what a geographical paper should be. It has been suggestive, instructive, and extremely interesting at the same time. But the suggestion in it which appeals to me most is that which touches a long-forgotten phase of Central Asian history. You will remember that when the Nestorian Christians scattered eastwards about the middle of the fifth century they

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* The botanical collections made by Mr. Price on this expedition are being worked out at Kew, and the geological specimens by the Geological Department of the British Museum. The entire zoological collection has been purchased by the trustees of the British Museum (Nat. Hist.). This consisted of 250 birds and 160 mammals; from the latter Mr. Oldfield Thomas has named 14 new species. Other zoological specimens, consisting of numerous species of the larger animals, were collected by Mr. Miller, an account of which he is preparing for the Zoological Society.

went to India, to Persia, to Arabia, and to Central Asia; and wherever they went they had by the eleventh century established themselves as a strong political factor in the countries which they visited. For my own part, I believe that "Prester, or Presbiter, John" was no myth at all. When Mongolian supremacy had made Asia secure for European travellers, there was a great demand for Prester John. He may have been one of two or three potentates in the East. He may have been Gur Khan who established the great Kara Khitai empire previous to the rise of the Mongol ascendancy. Or he may have been (as Mr. Carruthers apparently thinks, and as Sir Henry Yule also agrees) Wang Khan, chief of the Karaits, the Nestorian Christian tribe to which Mr. Carruthers has alluded. Now, to me it is very strange that a large Christian community should ever have existed in Central Asia and left no marks behind it. You all know that Dr. Stein has recently unearthed a marvellous chapter in the history of Buddhism by the results of his researches in Chinese Turkestan. I think we might reasonably look to Mr. Carruthers in the book he has promised us for something of the history of Christianity in those regions. This will be even more interesting than the Buddhist records. As regards another feature of Mr. Carruthers' work, there is no time to go into any details, but I must express my admiration of the energy he has shown in carrying out his surveys with his own hand, whilst at the same time he was burdened with all the responsibilities of the leadership of an expedition such as this. To my mind, it once again rather emphasizes the fact that it is advisable under similar circumstances for travellers in unknown and unmapped countries to attach to their parties, if they can, a trained professional geographer, who will do the spade-work of such map-making and surveying as has been accomplished by Mr. Carruthers. You can easily understand that when an explorer starts from one set of geographical values and reaches out far into unknown districts, and there ties his work to the results of another explorer's work who started from another part of the world, there must be a great deal between the two to compare and reduce to a common co-ordinate value ere we obtain a starting-point for future travellers to work from. This has been the case with Mr. Carruthers, who started from Russian values to work down to the Karlik range, and Dr. Stein, who based his work on Indian values, and, carrying triangulation along the Kun Lun, ended somewhere on the same range. Hereafter we shall have established a fresh fixed point of departure for all travellers in these very wild regions of Central Asia. But this I hope will be matter for future consideration by that branch of our Society which is known as the Research Department. In this connection I am happy to tell you that by new arrangements the Research Department meetings are to be open to all Fellows of the Society without waiting, as heretofore, for special invitations to be sent to those who happen to be specially interested. As we have here to-night several old geographical friends who have travelled in Central Asia, I will ask Sir Francis Younghusband to address you. He himself knows a good deal of Mongolia.

Sir Francis Younghusband: I think you will agree with the words of the chairman as to the suggestiveness of Mr. Carruthers' paper. It will only have whetted our appetite for those full results which he hopes to give us in the form of a book and in a paper to the Research Department of the Society. With a good personal scientific equipment and with a well-organized expedition, he visited that extremely interesting part of Asia from which the great Mongolian invasions took place. He saw the actual rendezvous of Jenghiz Khan's forces, and I think we here this evening must rather regret that he pulled himself up short, and did not give us the results of his investigations as to the causes that originated that tremendous invasion both of Asia and Europe. I had myself, until I had seen Mr. Carruthers, imagined that it must have been connected with that constant

desiccation which is so prevalent in parts of Asia very close to that visited by Mr. Carruthers. I have travelled about 2000 miles through Mongolia. I had seen it at its extreme eastern end; I passed all along the south; and traversed it across the centre; and in the whole course of my travel I do not believe I saw a single tree. It was in great part prairie land and greater part still arid desert. It came to me, therefore, as a surprise to see that there is a portion of Mongolia (which, considering its size, must be really a very considerable country in itself) which was well watered, very thickly forested, and in other parts forming a magnificent grazing-ground. He informs us that there is still most ample room for development there, and therefore I conclude it cannot have been the desiccation of climate which is the prime cause of these migrations of Mongols over Asia and Europe. Possibly the cause of the Mongol unrest, instead of being destitution, was prosperity; for we have experience that prosperity is quite as much the cause of unrest and movement as is destitution. It was not the recent great famine in India that caused unrest; it was rather the prosperity in India. And at the present moment here in England, it is not so much destitution amongst the very poorest classes as the prosperity amongst the best paid classes of our workers which is causing the existing unrest. Possibly Mr. Carruthers, when he comes to tell us of his investigations, will be able to give us some information on that point—whether it was the prosperity of the Mongols which set them thinking whether they might not still further improve their lot in other parts of Asia.

Another interesting point upon which he has fortunately favoured us with his opinion to-night is the cause of the deterioration of the Mongols at the present day. It is an extraordinary fact that these Mongols who had ruled China and India and the greater part of Asia are now people of comparatively insignificant importance. The conclusion he came to is one to which I had quite independently come myself, that the main cause at any rate is their religion. Mongols are of the same religion as the Tibetans. They both acknowledge the Lamaist form of Buddhism, and I have myself read a paper before the Sociological Society, giving my conclusion that the reason for the deterioration of the Tibetans was this form of Buddhism. The Tibetans at one time were a people of considerable importance in Asia. They were not confined entirely to Tibet; they were able to resist Chinese pressure upon them, and even to aggress upon the Chinese themselves. Dr. Stein's investigations have shown that about the eighth and ninth centuries A.D. they expanded over Tibet into Turkestan and into the province of Kansu, in China Proper, and he has seen the Tibetan walls in the Baroghil pass, on the northern frontiers of Chitral bordering on Afghanistan. It seems to me that this Lamaistic form of Buddhism emphasizes too much the idea of peace. The Tibetans' one idea is peace and to be left alone, and the consequence is that too great an attention to this ideal (which, after all, is not the highest ideal in the world) has led them not only to peace, but to sloth and laziness, which is one of the characteristics of the Mongols also. It is a fascinating subject, and I am sure, in Mr. Carruthers' hands, we shall have it treated most fully and with great scientific acumen. I think we may congratulate Mr. Carruthers upon his extremely successful journey and upon the very valuable paper he has read, and we may hope that we shall have still further journeys from him and still more interesting papers in future.

Mr. C. W. Campbell then made a few remarks.

Sir Thomas Holdich: As visitors to Mongolia seem to be rather rare and exceedingly reticent, I think I may now ask you to join in a very cordial vote of thanks to the reader of the paper to-night, and to wish him all success in his future travels.

MOROCCO AND ITS FUTURE.*

By ALAN G. OGILVIE.

WITHIN the last year Morocco has once again claimed for a time a full share of attention, and considerable interest now attaches to the possibilities of economic development in the country under its new conditions. For a region of the world physically so accessible from Europe, the interior of Morocco is comparatively little known. There are, indeed, numerous accounts of journeys in one part or another of the country, but many of these afford but little definite information about the nature and resources of the districts traversed. In recent years, however, several parts of the country have been made the subject of careful scientific investigation. The published results of these afford safe groundwork, and by supplementing them from other records of a less systematic character, it is possible to form a coherent picture of the country as a whole, and to obtain some idea as to the economic values of the various divisions into which it naturally falls.

Where our knowledge of geographical facts is so incomplete and so varied in value and exactness, as it is in the case of Morocco, the materials available can be put to most effective use by discussing first the dominant morphological features of the region, and by grouping round these the data bearing upon each of the other aspects to be studied.

Extent.—The north-west corner of the African continent to which we apply the name Morocco is the western part of the great natural region which stretches from the Gulf of Gabes on the east to the Atlantic on the west, and is known collectively as the Atlas lands. The length of Morocco from north-east to south-west is over 600 miles, while throughout the greater part of this length its breadth is some 250 miles.

Geomorphology and Relief.†—The country may be broadly divided into areas of three geomorphological types; high folded mountains, tabular lands of less altitude, and plains of a still lower general level. The fold mountains divide the tabular lands into two parts (see Map 1).

The region was once occupied by an ancient (primary) mountain system whose folds were of two general directions, either south-south-west—north-north-east ("Variscan" type), or north-north-west—south-south-east ("Armorican" type). This mountain system was denuded to a fairly even peneplain, which was subsequently lowered beneath the sea.

A great lapse of time (Secondary and Early Tertiary) followed, during which this submerged peneplain was overlaid by thick deposits of varying

* Research Department, April 18, 1912. Map, p. 640.

† This section of the paper owes much to the published work of L. Gentil, Pres. Geological Society of France, and to his generous personal guidance. Mons. Gentil has recently given an account of the geology of Morocco as a whole, accompanied by an excellent sketch-map in *Les Annales de Géographie* (March, 1912).

composition. Then began the series of movements ("Alpine" movements) which has given the Earth so many of its great mountain ranges. These movements raised the area in question once more above the sea.

In the process of elevation the central part was forced up as a crumpled ridge, forming a belt which traverses the region from north-east to south-west, but with important forks on its south-east side, and in close touch with a semicircular area of similar structure on the north. Broadly speaking, the land structure which has been thus produced, presents a backbone of rocks much folded and specially elevated, flanked by two wide regions where the elevation was essentially uniform and the strata were but little disturbed. What faulting there is runs along the margins of the folded band, and appears to have been related to the elevation of the ridge.

This main belt of folding persists as the High and Middle Atlas, prolonged, with intervals, by the Algerian Tell range along the Mediterranean coast. The link which connects the Atlas and the Tell sections of the belt is the highland on the left bank of the lower Moluya—a ridge which L. Gentil has shown to be structurally a continuation of the Middle Atlas. The forks show as the Anti-Atlas to the south, and the eastward and diminishing extension of the High Atlas towards the Saharan Atlas. The folded rocks of the semicircular area on the north form the Riff system from Melilla to Tangier and its continuation, the Betic Cordillera of Southern Spain.

The tabular areas which flank the folded mountains are represented by plateaus. That of the Atlantic side has been called the Moroccan Meseta, from the likeness which it bears in structure to the Meseta of Spain. To the east of the Middle Atlas, and wedged between it and the eastern fork of the High Atlas, is the beginning of the plateau of Shotts, which stretches through all the Atlas lands between the Tell range and the Saharan Atlas. On the south of the Atlas lies the great tableland of the Sahara.

The faulting which took place along the margins of the High Atlas accounts for the two triangular lowlands, the Houz of Marrakesh and the Sus plain, and the west end of the chain might therefore be well termed a folded block (*horst*).

Many points of great interest have recently been revealed in each of these structural divisions. In mountains the folding was accompanied by a great outburst of volcanic activity, and masses of volcanic rock to-day crown the Atlas at several points, notably at the junction of the Anti-Atlas with the High Atlas.

Another feature of the movements is a dipping of the axis of folding, which is notable in at least three places. It is owing to one of these dips that the south-west end of the chain tails off as it comes down to the sea. Again, in the north, the narrow depression by which the Moluya reaches the Mediterranean marks a dip of the axis which cuts off the Tell continuation of the folded belt from the northern extension of the Moroccan

Atlas. The third of these dips is that which breaks the dominant mountain chain by the gap connecting the eastern and western parts of the long depression that lies parallel to the Mediterranean coast, and separated from it by the Riff and the Tell range.

This depression itself is one of the most remarkable features of Morocco. Its eastern part (plain of Angad) is parallel to the folding, and is simply a filled-up syncline. The western section, on the other hand, lies across the line of the folding, and owes its existence to the dipping of the axis of folding.

The entire length of this great depression is filled with a recent (Miocene) deposit, and it has been shown by L. Gentil that this "South Riffen Strait" was the communication between the Atlantic and the Mediterranean before the Strait of Gibraltar was opened. The peculiar series of domes which seems to be the outstanding feature of the Riff, and the Strait of Gibraltar itself, are largely due to dips in the axis of folding in the Riff and Betic ridging.

The Western Tabular region appears to have undergone two elevations. The second and minor of these has produced a coastal strip some 50 kiloms. in width, and presenting an undulating-surface nowhere above 250 metres in altitude. This coastal plain is marked off from the interior plateau by a steep slope which is very continuous, and which, with a rise of about 100 metres, represents the coast-line prior to the second (Pliocene) elevation.

Sub-aërial or normal erosion has been at work since the elevation of these plateaus, but it would appear that they have not yet reached the mature stage. The valley forms of the Um-er-Rebia and other streams corroborate the evidence—drawn from the coastal plain—of two cycles of erosion. The land forms of the plateaus which are in process of dissection are just the types which would be expected in a peneplain which had been covered by deposits of varying composition and resistance and then re-elevated. Over great areas the ancient rocks which are mostly impermeable have been laid bare—some of them, indeed, may never have been covered—and their resulting relief is subdued and undulating. Of the other parts, tabular blocks with caps of the more resistant strata are very characteristic features. These have steep sides and are separated by narrow valleys. Occasionally a resistant bed produces an escarpment of great continuity and length, such as that overlooking the upper Moluya valley from the south-east.

The bulk of the Moroccan Meseta has an altitude of from 200–1000 metres. It is cut by the Atlantic coast for about 300 kiloms., and is separated from the Riff by the triangular lowland known as the *Gharb*. This plain and the low southern part of the Meseta—the *Houz*—are largely covered with alluvium. The eastern tableland of Morocco has an altitude of over 1000 metres.

It is difficult to say to what extent the mountains have been denuded,

but it is certain that erosion proceeds at a great rate in these altitudes. Most of the anticlines have been decapitated, and L. Gentil has shown that the deep oblique valleys of the western end of the High Atlas follow the ancient (Variscan) folds, while the great longitudinal valleys which predominate further east are due to the more recent (Alpine) folding. The main Atlas system has a general level of over 2000 metres, and many of the peaks exceed 4000 metres. The Riff has a general altitude of over 1000 metres, and in places reaches 2000 metres. The Anti-Atlas barely reaches the 2000-metre line. It is to be noticed that the whole country slopes gradually from the mountains in a south-easterly direction towards the Sahara.

It is evident, then, that Morocco may be divided both on the grounds of geomorphology and of altitude into the following areas: two great mountain systems—the Riff and the Atlas—with branches; three plateaus —the Meseta, the plateau of Shotts, and the Sahara plateau. Lastly, the three triangular lowlands of the west, the most northerly of which, the plain of the Sebu, runs north-east through the Taza gap into the Moluya basin, and so on beyond the confines of Morocco. The other two lowlands differ from this one in their geology, but on the ground of altitude they may be classed together.

Coasts.—The entire coasts may be described morphologically as young. The oceanic coast-line seems to have been determined largely by faulting, and the relatively recent upheaval of the land has not yet permitted the cycle of erosion to advance far enough to produce an indented margin. The practical result of this is that harbours are few, and of good harbours there are none.

The coasts everywhere confirm the above division into regions. Thus the Riff coast is very steep, but since it is parallel to the folding, it is almost smooth. The transverse coast of the Strait, where marine erosion acts across the axis of folding, is more indented, and provides the harbour of Tangier. The northern alluvial plain shows a low straight margin bordered with lagoons and sand-dunes, which are always moving except where they are fixed by vegetation.

The Meseta coast is higher and more uneven. Moreover, it describes an outcurve. It provides the inferior harbours, or rather roadsteads, of Casablanca, Mazagan, and Safi. It should be mentioned, however, that the lagoon or *haff* of Walidya, north of Cape Cantin, could probably be made into a good harbour. Southward extends a short stretch of lower coast answering to the Houz, and then comes the steep coast which cuts across the folds of Atlas; Cape Ghir itself presents the section of an anticline. Agadir lies under the shelter of this cape.

The plain of the Sus shows a low sandy shore, which in turn gives place to a high coast-line where the Anti-Atlas meets the sea.

Hydrography.—Morocco is drained in three directions by rivers flowing to the Atlantic, the Mediterranean, and the Sahara. Of those on the

Atlantic slope four are specially important. The Sebu, which threads its way through the Middle Atlas to Fez, and then, after skirting the northern edge of the Meseta, emerges on a low triangular plain. From here to its mouth the Sebu is a typical meandering river. It is navigable for small boats, and canalization of the river, which would be costly but not difficult, would enable small steamers to ascend to Fez.

The Wadi Um-er-Rebia rises in the Middle Atlas and crosses the Meseta in a deep-cut narrow valley. It follows a sinuous course, especially in its lower part, but it has not reached the stage of a freely meandering river, for the bends are still enclosed by high banks. The Um-er-Rebia has plenty of water, and by it the timber cut in the Atlas is regularly floated down to the sea; but since the river has not yet graded its bed, and rapids occur at several points, it will probably remain useless for navigation.

The Tensift, which rises near the junction of the High and the Middle Atlas, drains the Houz of Marrakesh and closely follows the southern rim of the Meseta.

The Sus drains the basin between the High Atlas and the Anti-Atlas. It reaches the sea near Agadir.

At present all these rivers are rendered practically useless for navigation by the existence of bars at their mouths, produced by the action of the waves and currents.

Three important rivers flow south-eastwards from the High Atlas—the Wadis Draa, Ziz, and Gir. Of these the Ziz and the Gir lose themselves in the desert, while the waters of the Draa reach the ocean only at intervals.

The one important river which flows to the Mediterranean is the Moluya, which takes its rise where the Middle and High Atlas converge. It flows with a gentle curve to the north, and reaches the sea at the extreme north-east corner of Morocco. The Moluya could be canalized without great difficulty over much of its course.

In the Atlas the headwaters of the Sebu, the Um-er-Rebia, the Moluya, and the Ziz all lie within a circle whose radius is 50 kiloms.

Climate.—Morocco lies roughly between lats. 30° and 36° N. The sub-tropical high-pressure region of the North Atlantic has its centre west of the Canaries in winter, and between the Strait of Gibraltar and the Azores in summer. Thus between the winter and summer solstices it oscillates roughly from the latitude of South Morocco to that of North Morocco.

In summer the intense heating of the Sahara produces a region of relatively low pressure there, and in a minor degree the same phenomenon is seen in the Moroccan plateau (Meseta), a condition slightly resembling that of the Punjab.

The prevailing winds result from these pressure conditions. Speaking generally, Morocco may be said to be in summer under the influence of the north-east trade winds, and in winter under that of cyclonic systems

passing from the west. At that season so many of those cyclones move from the Atlantic up the Mediterranean that that sea is made to appear as a trough-like depression lying between the higher pressures of Europe and the Algerian plateau. The tracks of these storms frequently pass over Morocco. As the belt in which the trade winds blow, in common with all the climate zones, extends gradually northward in summer and southward in winter, it follows that there will be a gradual change from a longer to a shorter duration of these winds as one goes northwards. Thus at Cape Juby, which lies to the south of Morocco and already is in the Sahara zone, the north-north-east wind blows steadily for eight months (March to October), and in the remaining four (November to February) the wind is changeable, though mostly north-east.

At Mogador the north-east trades blow for about six months (May to September), and in the other six south to west winds blow; but even then off-land winds are frequent.

In the Strait of Gibraltar the winds are diverted and gain force, with the result that strong east or west winds are characteristic throughout the year, and only in August and September are calms frequent.

The temperature conditions in the whole of the part of Morocco which looks to the Atlantic are greatly modified by two factors: the first, that the trades blowing from more northerly latitudes are relatively cool winds; and the second, that the Atlantic coast of Morocco is washed by abnormally cold water. There is a difference of 5° C. between the temperature of the surface water at Mogador and of that 20 miles to sea. This belt of cold water is partly explained by the presence of the cool "Canary current," but chiefly by an upwelling of cold water from below. The trade winds act on these surface waters in two ways—the extreme dryness of the winds, which are here blowing off land, causes excessive evaporation from the coastal waters, while the great regularity of the trades actually produces a westward drift of the surface water. But to compensate and keep the surface everywhere at one level the cold water rises. The effects of this are of course more evident in the south than in the north, for the difference between air and water temperatures increases southwards. A moist atmosphere results, fogs which palliate the relentless rays of the sun are frequent on the coast. There is a very heavy dewfall, especially in summer, upon a coastal belt of more than 50 kiloms wide. In the coastal regions the average annual temperature is low for the latitude and the variation between summer and winter and between day and night temperatures is small. The precise cause of the heavy dewfalls has yet to be found, but it seems possible that the relatively slight fall in the temperature at night may suffice to produce them in view of the proximity of the moist coastal atmosphere.

Thus, over a large tract of Morocco there is an absence of extremes of heat and cold, due to the proximity to the ocean, and especially to the upwelling of cold water, to the direction of the prevailing wind, and to a

third factor—the relief. The Atlas mountains, in fact, form a complete climatic barrier, so that in the greater part of Morocco the influences of the Saharan climate are not felt. This climate is so different that the south-eastern part of Morocco, which comes under its influence, must be considered separately. The interior of the western plateau, however, exhibits continental conditions in a marked way, as was indicated by the low summer pressure above mentioned. From the few observations which exist, it may be seen that while the average temperatures for January and August at the coast are 16° C. and 22° C. (61° and 71½° Fahr.) respectively, those of the plateau are about 11° C. and 34° C. (52° and 93° Fahr.). Moreover, the contrast of day and night temperatures is equally striking; below the altitude of 660 metres, however, frost is rare.

The distribution and quantity of the rainfall is conditioned first by the seasonal winds and secondly by the relief. In summer the Mediterranean coast receives a small rainfall, but this would seem to be brought, not by the north-east winds from the Mediterranean, but rather by occasional storms which even at this season come from the Atlantic.

Climate and the Features which result from it—West of the Atlas.—The bulk of the Morocco rainfall comes from the westerly cyclonic winds, and since the period in which the west winds blow is shorter in the south than in the north, the length of the rainy season and the quantity of rain diminish southwards. Thus, while in the extreme north no month is rainless, though summer is a dry season, in the south the period mid-April to mid-October is practically rainless.

It is a fact of great importance that the heavy dewfall is at its maximum precisely in the rainless period.

In the rainfall distribution on the Meseta, distance from the sea plays a more important *rôle* than does relief, though the coastal hills emphasize the contrast between the coastal belt and the interior by causing a rain-shadow.

This contrast is the most striking fact in Moroccan climates. Towards the interior of the plateau the relative moisture of the atmosphere decreases very rapidly. This makes the intense summer heat of the region bearable. In this region the rainfall maxima are probably not at the winter solstice, but near the equinoxes, and especially in spring; most of the rain comes in thunderstorms, which may be due to the proximity of the mountains. As there are no systematic observations of rainfall for Morocco, Th. Fischer, who made a special study of the meteorological conditions, had to base his conclusions as to the distribution of rainfall upon inference from the vegetation of the several parts of the region. For numerical estimates he relied upon comparison with Tunis and Algeria, which enjoy climates similar to that of Morocco. It had been shown that in these adjacent regions no cultivation is possible where the rainfall is less than 400 mm. annually, that all land receiving from 200–400 mm. rainfall is steppe, and that where there is less rain than 200 mm., the land

is desert. From consideration of the distribution of vegetation and of cultivation in Morocco, with such information as he could obtain by personal observation and from sporadic records of rainfall, Fischer arrived at conclusions which he summarized in a map. The western portion of map 3 is taken from the rainfall map which he thus constructed. From this sketch-map it will be seen that a coastal belt and the northern (Sebu) plain receive a rainfall of from 400–600 mm., while there is an area of low rainfall (200–400 mm.) occupying the interior of the plateau. Beyond this the influence of the relief upon the rainfall is very marked, and in the mountains heavy rains (over 800 mm.) prevail—generally in the form of snow. This snow lies throughout most of the spring and summer, the snow-line being always much lower on the north-west than on the south-east slopes. It has not yet been proved that eternal snows exist in the Atlas. The melting of the snow produces floods on the rivers long after the rainy season on the plateau has ceased.

It seems possible that Fischer has not attached enough importance to the relief in drawing the isohyets on the south-west extremity of the Atlas and in the Riff, where his lines cross the high ranges and deep valleys at right angles.

The Black Soil.—The coastal belt of Morocco, which enjoys the favourable climate indicated above, viz. the periodical rainfall plentiful in the north, the moist atmosphere, and the heavy dews in the dry season, possesses in addition one of the most fertile soils in the world. This is a black earth, or *tirs*, similar to that of southern Russia. It owes its formation largely to the moist climate and to the accumulation of organic (vegetable) matter due to the decomposition of annuals. The tirs is always found on a calcareous subsoil, and, according to L. Gentil, its other ingredients are derived from dissolution of the latter. Th. Fischer, on the other hand, believed the origin of these ingredients to be a fine aeolian dust carried up in the interior by cyclonic storms, and deposited with moisture near the coast. In addition to having all the chemical properties of a rich soil, the tirs has a great capacity for retaining moisture. The black earth by no means covers the entire coastal plain, and where it exists it is of very varying thickness. The reason of this is that it is easily washed away, and as a consequence it is not to be found in the neighbourhood of running water, for instance, near the Um-er-Rebia or close to the sea. As the climate becomes slightly less moist towards the interior the black tirs gives way to a red soil (*hamri*), slightly less rich in nitrous ingredients.

The Vegetation, etc.—The plants which are regarded as truly Mediterranean in type are those which can stand a long dry summer, and which like a mild winter. Noteworthy among these are the olive—of which the chief enemies are frost and summer rain—the ilex, cork oak, fig, vine, etc. In addition to the plants typically Mediterranean, there flourishes in Morocco the argan tree, which is a relic of an ancient warmer climate.

The argan has a hard wood and a fruit which furnishes oil. It is found all over the Sus country (to the south of the Western Atlas), and also in south of the Meseta. It appears to be able to grow on almost any soil.

The frosts exclude the Mediterranean type from the mountains of Morocco, and where the rainfall is sufficient these are covered with a mixed deciduous and coniferous forest.

The areas and potential areas of forest in West Morocco are extensive. They include (*a*) the whole of the coastal belt so far as it is not covered with the tirs—which is not suitable for forests; (*b*) those parts of the plateau which on the rainfall map are shown as having an annual rainfall of more than 400 mm. and the entire slopes of the Atlas and Riff from Cape Ghir to Cape Spartel, up to an elevation of about 2000 metres.

The forests at the lower altitudes are characterized by the olive, ilex, laurel, arbutus, and mastic tree, etc., and in the south by the argan tree and *Callitris quadrivalvis*. The forests on the mountain slopes are characterized by cedars and pines, poplars, planes, elms, aspens, thuyas, walnuts, noyer, arars, and argans. The arar is a hard conifer, special to Morocco, which yields gum sandaraque. The walnut covers large areas, and yields much fruit. The undergrowth includes juniper, erica, fassoukh (yielding gum ammoniac), gum-tree, euphorbia, akaout, and sarguine—the last two used for tanning.

The forests offer immense possibilities of development with capital and scientific methods. At present the cork oak is being ruthlessly destroyed by the natives.

For the reasons given above, all parts of the coastal belt 50 to 70 kiloms. wide, covered by the tirs, form valuable arable land. All the necessary conditions are found here for the growth of barley, which is the most extensively cultivated cereal at present, and for wheat and maize. The grain is sown at the beginning of the winter rains, through which the development is steady. After the rains cease—in March in Central Morocco—the heavy dewfalls provide sufficient moisture till the grain is ripe. Thanks to the moisture-holding qualities of the tirs, a variety of maize of an extremely short period of growth can be successfully cultivated. Sown at the end of the winter rains, it is reaped in June. The harvests in the coastal belt are as follows:—

	Barley.	Wheat.	Maize.
South	Mid-April	—	—
Centre	Beginning of May	Mid-May	Beginning of June
North	End of May	Mid-June	—

Thus the harvests of the most important grains succeed one another quickly—a very satisfactory state of affairs.

Other important crops in this zone are alapiste, beans, flax for linseed,

chick-pea, sorghum (or dhurra), the last three of which can only be grown by irrigation in the South Mediterranean belt. Less important are cummin and carraway, coriander, mustard, hemp, and sesame, and, in the south, cotton. The cultivation of all these is carried on by the natives, but the introduction of scientific methods would increase production enormously.

Failure of crops owing to drought is a rare occurrence, and by judicious irrigation in many parts of the zone it could be absolutely prevented. The system of irrigated fruit gardens, or *huertas*, which exists at present round the villages might be greatly extended, and there is reason to believe that such gardens here would be far more productive than those of Malaga or Valencia.

In these huertas there might be cultivated, not only such fruit trees as the orange, citron, fig, almond, pomegranate, vine, peach, banana, apple, pear, and carob, but also sugar-cane and rice—the conditions for these being much more favourable than the South Mediterranean.

In all the northern plain of the Gharb, as the Sebu basin is called, as far as Fez, the rainfall is plentiful. It is a superb stock-rearing country, and cattle abound. In the low hills forests are luxuriant, and the lower ground could produce grain in great quantity.

Everywhere throughout the Moroccan Meseta the decrease of moisture away from the coast is reflected in the vegetation. The argan woods and undergrowth thickets give way to the gum acacia and cicyphus lotus which are characteristic of the steppes. There is generally a transition zone of 10 to 15 kiloms., in which the trees get smaller and more thorny. Then the steppe begins. It is covered with artemesia, getaf (*Atriplex halmius*) and *Bromidus rigidus*.

This steppe zone extends through the entire length of the Meseta, and almost to the foot of the Middle Atlas, having a breadth of from 80 to 100 kiloms. It is mostly of an altitude between 500 and 1000 metres.

In the height of summer the steppe is quite burnt up; but rainstorms, which may occur here even in early June and in September, cause the grasses to sprout. Throughout the greater part of the year the steppe is an admirable pasture-land, and at the present time it supports great herds of cattle, sheep, and goats. Camels too are reared for transport purposes. The human population is considerable, although necessarily of semi-nomadic habits; in the summer they move largely into the mountains.

Agriculture is practised to a very limited extent, chiefly where water emerges in springs at the surface of the impermeable rocks of the ancient peneplain. The crop is barley, and it is often a failure.

Throughout the greater part of the steppe zone the rivers which traverse it, and especially the greatest of them, the Um-er-Rebia, have embedded themselves in deep steep-sided valleys which are too narrow for irrigation purposes.

There is, however, a belt, 30 to 40 kiloms. wide, running along the foot of the mountains, which Fischer has called the zone of irrigation-

oases. The mountain torrents of ages have spread here a vast cover of alluvium, and these same torrents provide the almost unlimited water for irrigation. Moreover, the greatest quantity of water comes when it is most required, that is in early summer, when the snows are melting. The water for irrigation is diverted from the streams into underground conduits which have been dug with much labour. The loss by evaporation is thus greatly minimized. This alluvial zone is perfect for fruit culture. Even at present big crops of olives, pomegranates, oranges, figs, etc., are furnished —as at Marrakesh, a typical oasis town—and these might be greatly augmented. In the mountain valleys, by aid of irrigation, cereals are cultivated in summer—wheat, barley, and rye generally, maize up to 1700 metres altitude. The utilization of the torrential streams for power would be simple. In the mountains there are neither Alpine pastures nor an Alpine flora, properly speaking, and above 2000 metres all is bare rock.

It will, therefore, be seen that Morocco west of the Atlas can be divided into three economic zones, viz. a cultivation zone, a pasture zone, and an irrigation oasis zone specially suited for fruit trees.

In certain parts of the region the large supply of water and the sloping land provide the necessary conditions for irrigation on a large scale. This is specially obvious, first, in the entire Plain of Gharb—watered by the Sebu and its tributaries; secondly, in the extreme north of the Atlantic coast, by the waters of the Lukkos; and, thirdly, the coastal belt between Rabat and Azzemour, *i.e.* some 150 kiloms. Thus altogether many thousands of square kilometres might be easily brought under cultivation.

*Climate and the Features which result from it—East of the Atlas.**—It has been shown above that Morocco east of the Middle Atlas is structurally the continuation of Algeria, comprising as it does the twofold systems of the Tell and the Saharan Atlas and a high plateau which separates them. It is no less true to say that this part of Morocco, which is cut off from all Atlantic influences, is climatically the continuation of Algeria, for in common with Algeria Morocco is subjected to the influences both of the Mediterranean and the Sahara. Thus the district can be divided into three climatic zones as well as into three structural zones. The first, which corresponds more or less with the Tell mountain region and its narrow coastal plain, is a region of forests and agriculture; the second, corresponding roughly to the high plateau, is steppe, and at best a land of pasture; while the third zone, stretching south from the High Atlas, is the land of the date palm.

Eastern Morocco derives practically all its moisture from the westerly cyclonic winds, and it is for this reason that the rainfall diminishes so rapidly from the Mediterranean coast southwards, for the Middle Atlas

* The most recent work on this part of Morocco is 'Les Confins Algéro-Marocains,' by Augustin Bernard, Professor at the University of Algiers, and Lecturer at the Sorbonne, who has kindly advised on various points arising in the treatment here adopted.

throws a rain-shadow over all the southern part of the region. On the coast the moist westerly winds prevail from October to April or May, while throughout the other six months the wind varies in direction from north to east.

The mountains of this part of the Tell region are not sufficiently high to extract much moisture from these winds, so that May to September, even at the coast, are very dry months, while from June to August no rain falls. The average annual rainfall is from 400 to 600 mm., and the maximum is probably in early spring. At the coast the average temperatures are 10° to 12° C. (50° to 53° Fahr.) for January, and 25° to 27° C. (77° to 81° Fahr.) for July. There is snow on the hills in December and January.

As is shown on Map (3) the rainfall increases eastwards towards Algeria, as the effect of the mountain barrier of the Middle Atlas becomes less apparent. As a result the higher mountains near the frontier between Morocco and Algeria are covered on their northern slopes with timber many miles farther south than the northern margin of the steppe in the Moluya basin. It is obvious, however, that this occurrence of woods is merely an incident in the steppe zone, for the southern slopes of the same zone are clothed only with alfa grass—a typical steppe plant.

In this zone, the mountains, and especially their northern slopes, bear fine trees of the typical Mediterranean forest, including the cedar, cork-oak, ilex, chestnut, and thuya. Of the low ground much is under cultivation for cereals, and some of the plains are very rich. In the long narrow lowland mentioned above, which unites the Sebu valley on the west to the lowland of north-west Algeria on the east, cultivation is general only to the west of the watershed near Taza. From here eastwards the moisture quickly diminishes, and the belt, which for the most part has a sandy soil, assumes the character of a steppe. It is not until a long way east of the Moluya that the rainfall increases slightly, and in the eastern parts of the Plain of Angad, which stretches up to the Algerian frontier, irrigation becomes possible in a rich alluvial soil of volcanic origin, olives and other fruits being produced.

The eastern plateau of Morocco, indeed, except for the hills mentioned above and several rich irrigated valleys on its northern border, corresponds with the zone of steppe.

The climate of this plateau, which over a large part has an altitude of more than 1000 metres, is extremely rigorous, great differences of winter and summer and of day and night temperatures characterizing the region. Snow often covers the plateau in late spring; even in summer a night snowfall is by no means unknown. The entire plateau surface is covered with alfa and artemesia, which form pasture for large flocks, and in the valleys a shrub grows which affords the fuel essential to the nomadic inhabitants in the cold winter. The middle Moluya valley, although some 500 metres below the level of the plateau to the east of it, is so dry

that it has a similar vegetation. The only exception is a narrow strip of tamarisk trees bordering the river itself. It seems possible, however, that much of this valley could be irrigated by the streams from the Middle Atlas. The valleys of these mountains are practically unknown to Europeans, but according to de Segonzac it is "populated and rich," its slopes wooded, and its valleys fertile." Its inhabitants appear to be occupied with stock-rearing to some extent.

The agricultural possibilities of the steppe zone, then, are very limited, for vegetation is interrupted in winter by cold, and in summer by drought. But it is suggested that management of the springs and wells and the damming of the wadis, as also the introduction of dry-farming, might increase the productive areas. The future of the steppe appears to turn upon the development of stock-rearing, and upon the exploitation of the alfa grass as in Algeria.

Saharan Morocco.

The Saharan zone of Eastern Morocco forms the eastern part of the continuous Saharan zone of Morocco lying to the south-east of the High Atlas. This climate belt has a very hot summer with a temperature of about 88°·5 Fahr., and a moderate winter with an average January temperature of about 51° Fahr. The higher mountains sometimes have snow. The annual rainfall is less than 200 mm. The zone is therefore one of desert, agriculture being impossible without irrigation. The only districts which have vegetation and inhabitants, then, are the oases formed where the wadis, flowing from the mountains into the desert, have still sufficient water for the irrigation of the date palm.

Of the great wadis, the Draa, the Ziz, and the Gir, the most important is the Ziz, watering as it does the great oasis of Tafilelt.

In the upper valleys of those streams the walnut tree flourishes; lower down the olive, pomegranate, apricot, peach, and almond are successfully grown, and the zone of date palms is reached where the rivers leave the mountains. In the desert the wadis spread out to form a wide belt of "braided" stream. Such areas are covered with a natural growth of tamarisk, but they can also produce very rich crops of cereals; the tamarisk wood is used in irrigation works. The flooding on the Saharan wadis, which is here essential to agriculture on a large scale, is somewhat irregular. The streams, however, in their passage through the Atlas, traverse successive plains and ridges, cutting deep gorges in the latter, and it would appear that the construction of dams to regulate the flood-waters would present no unusual difficulty.

Population and General Economic Considerations.—The life of the natives in the Saharan zone of Morocco is semi-nomadic. They are a pastoral people who come down and settle in the oases regularly in autumn for the date harvest, and also at other times, when a flood makes it possible for them to sow a crop of grain.

Many explorers have made rough estimates of the population of Morocco,

but the only adequate detailed survey is that published by Captain Larras in 1906. He gives 4,600,000 as a maximum for the whole country, including the Saharan border. Of this number there appears to be about 250,000 Jews and 15,000 Europeans.* The rest are composed of Berbers and Arabs, with an admixture—especially in the south—of Sudanese negroes. The Berber element is very widely distributed, though in some districts it has changed its habits and language under the Arab influence.

The Arabs were comparatively late comers to Morocco, and to-day they form, even on the plains, where they are most spread, but one-third of the population. The higher ground is left to the Berbers or Arabized Berbers. Pure Berber tribes inhabit the high plateau between the Houz and the Gharb, and the entire Atlas and Riff, while the Sus country includes one settled Arab tribe in the midst of an otherwise Berber population. The Arabs in Morocco form little more than a ruling class, and in many parts their rule is not even outwardly acknowledged. In the Middle Atlas, where the Arabic language has never penetrated, Mohammedanism, upon which the Arab rule is based, is practically unrecognized, and the mountaineers are still semi-pagan. In this connection it is important to note that the Moroccan is not a religious fanatic. He is hostile to the intrusion of foreigners, whether they be Mussulman or Christian, and it is the best Mussulmans—those of the towns—who are most friendly to Europeans.

The two races differ in their habits. The Arab is chiefly nomadic, while the Berber is sedentary and industrious, is attached to the soil, and is generally anxious to earn money.

The Jews are scattered widely in Morocco. They fall into two classes: first, those whose ancestors have been in the country for very many centuries, and who have adopted the Arabic language. They are to be found especially in the Riff, High Atlas, and the Sus country. Secondly, there are the descendants of the Jews who came from Europe some five centuries ago. These Jews speak Spanish, and mostly live in the towns. They are occupied chiefly with commerce and industries.

The sketch-map—copied from Bernard and based upon the estimates of Larras—shows that the distribution of population is largely dependent upon the relief, the soils, and the climate. Thus, with the exception of the towns, the only areas of 40 persons per square kilometre are the oases and the district of the rich tirs. On the plateau the population of the steppe zone is less than half that of the rest and considerably less than that of the mountains. Except in the oases, the population practically ceases south of the Atlas.

In the towns many of the inhabitants are occupied with industries, such as leather working, the weaving of wool into carpets, clothes, etc., or of silk, which is imported from France. These industries are destined to die out as soon as foreign competition has free scope in Morocco.

* Th. Fischer stated the population to be certainly not more than 8,000,000, and perhaps considerably less.

Sufficient indication has been given above to show that the agricultural possibilities of the country are very great. When modern methods have been introduced both in agriculture and in the rearing of stock—cattle, sheep, and goats—and when efficient communications have been established, it is difficult to place a limit to the possibilities of the country in this direction.

Communications are in a very backward state in Morocco. There are no roads, and of course no railways. The caravan tracks are often impracticable in winter. At present the journey from Tangier to Fez occupies eight days, and is impossible in bad weather. The most frequented route is that from Mazagan to Marrakesh. Future development of the communications must follow largely the main caravan routes. The economic considerations would seem to call for the construction of at least three main railway routes. First, a coastal line from Rabat to Mogador—possibly to be prolonged to Tangier and Agadir. This would serve to collect the agricultural produce of the coastal belt for exportation. Secondly, a line or lines would follow the frequented routes across the Meseta, perhaps from Marrakesh to Mazagan or Casablanca. Such lines would tap the stock-rearing districts. Thirdly, a line from Fez to the coast to tap the Sebu basin. This line might very easily be prolonged in the gap to link up with the Algerian system. Any great development of the possible irrigation zone at the foot of the Middle Atlas would certainly call for a collecting railway of the "Piedmont" type, which would perhaps link up Marrakesh and Fez. Much of the country through which this line would pass is at present peopled by warlike and independent tribes.

It has been pointed out that if the resources of Morocco are to be developed by a European Power, that power must be politically secure, and that if peace is to be kept in the Atlas lands of North Africa constant watch must be kept against the Saharan tribes.

This is most easily done with the aid of strategic railways. The South Oranais railway at present has its terminus at the oasis of Colomb-Bechar, where it taps one of the main trans-Saharan caravan routes. It is considered possible that this line might be extended to the populous oasis of Tafilelt and thence over a pass of 2125 metres to the Molouya. From here the strategical line could be prolonged over the watershed to Marrakesh, and perhaps to Mogador. A light railway to join the upper Mylouya to Algeria might be justified by military reasons and by the possible development of stock-rearing in this district and on the east plateau.

This scheme of railway construction has left entirely out of account the possible mineral wealth of Morocco, any development of which might profoundly modify the routes followed by railways.

The information with regard to minerals in the country is very scanty. The similarity between the geology of the Moroccan Meseta and that of the Meseta of Spain has led to surmises as to a probable wealth of minerals

but such investigations as have been published do not give ground for great hopes in this region. On the other hand, copper ores and other minerals have been proved in the Sus country and in the Rif. Coal has not yet been shown to exist in any quantity, though petroleum wells exist in the neighbourhood of Tangier.

The mineral survey of Morocco, however, is so little advanced, and so few of the results have been published, that it is impossible at present to make any forecast as to the future of the country in this respect.

The future of fisheries is much more assured; these are at present undeveloped. Sardines, mackerel, and tunny abound all along the Atlantic coast from Cape Spartel to Cape Rhir, and crabs and lobsters in places. With the aid of cold storage these fish might easily be brought to the European market. Coral is also found on the Atlantic coast, and towards the end of winter great schools of shad ascend the rivers. These are smoked in large quantities by the natives.

The foregoing sketch of Moroccan geography goes to show that the country, though undeveloped, is potentially a rich land. In parts it possess all the features of an agricultural region of the highest value. In other parts the forests, if scientifically treated, would yield big returns, although a considerable number of years would necessarily elapse before these began to come in. Further, nearly all parts of Morocco which are unsuited for agriculture or forestry can be utilized for stock rearing; fisheries, too, will afford a good return for well-directed encouragement, and there is the possibility of the existence of mineral wealth. But in order that these developments may be brought about Morocco must have a peaceful and sure government, capital must be expended, and tactful treatment must remove for good and all the ancient Moroccan suspicion of the foreigner.

LIST OF THE MORE IMPORTANT RECENT WORKS CONSULTED.

'The Africa Pilot,' Part I., 1907.

'Annuaire du Maroc.'

Augustin Bernard.—(*a*) "Les productions naturelles, l'agriculture l'industrie et la Commerce au Maroc," *Rev. Gen. des Sciences* 1903.

(*b*) "Une Mission au Maroc," *Comité du Maroc*, 1904.

(*c*) "Les Confins algéro-marocains." Paris: E. Larose. 1911.

Theobald Fischer.—(*a*) "Wissenschaftliche Ergebnisse einer Reise im Atlas-Vorlande von Marokko," *Pett. Mitt. Ergänzungsheft* No. 133, 1900.

(*b*) "Zur Klimatologie von Marokko," *Zeitsch. d. Gesells. f. Erdkunde.* Berlin, 1900.

(*c*) "Marokko," *Geog. Zeitschrift*, 1903.

(*d*) 'Mittelmeerbilder.'

Louis Gentil.—(*a*) 'Explorations au Maroc.' Paris, 1906.

(*b*) "Notice sur l'esquisse geologique du Haut-Atlas Occ.," *Annales de Geog.*, 1907.

(*c*) "Rapport au Comité du Maroc," *Renseign. Col. Afrique française*, 1908.
(*d*) "Une Leçon de Geographie Physique sur le Maroc," *Rev. de Geog.*, 1909.
(*e*) "Le Maroc et ses Richesses naturelles," *La Géographie*, 1910.
(*f*) "L'Amalat d'Oudja: étude de geog. phys.," *La Géographie*, 1911.
(*g*) Numerous short geological papers in the C. Rd. Ak. Sc. Paris, 1906–10.
(*h*) "Lä Géologie du Maroc et la genèse de ses chaines," *Annales de Geog.*, 1912.

JULIUS HANN.—'Handbuch der Klimatologie.' Stuttgart, 1911.
K. KNOCH.—"Die Niederschlagsverhltnisse der Atlaslander," *Jahresb. Frankfurter Verein f. Geog. and Statistik*, 1905–6.
N. LARRAS.—"La Population au Maroc," *La Géographie*, **13**, 1906.
A. PHILIPPSON.—'Das Mittelmeergebiet.' Leipzig, 1904.
V. PIQUET.—'La Colonisation française dans l'Afrique du Nord.' Paris: Colin. 1912.
L. RAYNAUD.—'L'Hygiène et la Médecine au Maroc.' Alger, 1902.
LE MARQUIS DE SEGONZAC.—'Voyages au Maroc.' Paris, 1903.
'Au Cœur de l'Atlas.' Paris, 1910.

Prof. MYRES (after the paper): This has been a paper of a rather different character from many which have been before the Department in the last few sessions. Whereas other papers have dealt with geographical detail, or with special problems, this is an attempt—and I think a successful attempt—to put together the main results of other people's work in an area which has for the moment a peculiar interest of its own. The result is, that we are confronted, as we should expect, with a variety of problems, all worthy to be discussed on a more elaborate scale than is possible within the limits of a single paper. I think we have to congratulate Mr. Ogilvie on the way in which he has brought out the salient results and suggested matters for discussion now. I will ask Captain Lyons if he will say a few words.

Captain H. G. LYONS: I have nothing very definite which I can say from personal knowledge, but I should like to give a note of warning with regard to that Saharan area of barometrical low pressure, as being a fact which is often stated, but upon which it is not well to lay too great stress. Of course, observations are very rare there, and observations at points of which the altitudes are definitely determined are rarer still; but as they accumulate it seems more likely that the Sahara is a vast region of only comparatively low pressure than of a very marked low pressure, and, as such, affecting strongly the air circulation. As regards Mr. Ogilvie's paper, I welcome it as a critical discussion of an area and of a large amount of observational material in this country where the descriptive material is so abundant, and where such critical discussions of it are only too infrequent. I am sure such a study as this is an excellent preparation for a practical investigation of the area in the field, and I feel very strongly that the furtherance of such investigations by those who are adequately trained, and who have prepared themselves in such a way as Mr. Ogilvie has, ought to be one of the foremost aims of this Society.

Dr. FALCONER: I fear I cannot say much with regard to Mr. Ogilvie's paper. I wish, however, to congratulate him on the success with which he has brought together the results of other workers, and correlated the various observations which have been made throughout the country. I am a little sorry that Mr. Ogilvie has

not stated in detail the sources from which he has taken the various portions of the paper. In place of the general bibliography, it would be useful to have references given at the foot of each page, showing which author is responsible for the information. One or two points are, perhaps, open to discussion. For example, Mr. Ogilvie speaks of some of the surface features of the present day being due to the dipping of geomorphological axes. That is a matter of very great interest, and one which would have borne much fuller treatment in the paper. There is also a remark about some of the valleys of to-day being defined by the lines of Variscan folds. Those very early lines may perhaps in some cases have affected the present topography of a country, but I think it is very doubtful whether it is true in many cases. It has been suggested that these Variscan folds are responsible for the parallelism of some of the rivers in the north of France; but it seems somewhat rash to assume that the topography of the present day should be defined by a very ancient system of folding in a land which has been subjected more than once to repeated crustal movement and erosion. Then I should like to ask Mr. Ogilvie whether he has any information as to the occurrence of a recent pluvial period in Morocco. Throughout the greater part of the Sahara and the Sudan there is evidence that there has been a pluvial period within comparatively recent times, and that since then there has been a period of desiccation in certain places, and especially in the Sahara. Can any of the surface features of Morocco be ascribed to erosion during this recent pluvial period in Africa? Could the *black earth* of which Mr. Ogilvie has spoken be in any way due to alluvial accumulation during this period? If the organic matter in it arises simply from the decomposition of annuals, there seems no reason why this *black earth* should not be in process of accumulation at the present day. Perhaps Mr. Ogilvie could add some information upon this point. I think, however, that Mr. Ogilvie has done a very useful piece of work in combining all these scattered observations in such a way as to make them more accessible and more valuable to future workers.

Dr. H. R. Mill: It has given me great pleasure to read this paper and especially to hear the summary in which Mr. Ogilvie has put the facts before us. I think it promises well for the rising generation of geographers when a piece of work like this is put together in so workman-like a way. It is important that the work of specialists in different departments should be combined in such a manner as to throw light upon the real problems of geography as a science, and I think that in this paper that has been gone about in just the right manner. I only wish there were more papers of the kind brought before the Society not only at the Research meetings but at the evening meetings as well, because it is important that before any one attempts to do original work in the field he should have learned how to co-ordinate the work of others and to ascertain what is already known about the region he is going to visit. The expression "pluvial period" touches upon a subject I have studied a little. I do not know on what evidence the pluvial period in the Sudan may rest, but I do know that in arid regions as a rule the effect of short but exceedingly heavy torrential rains is far greater in the work of excavating river-valleys than it is in a cultivated land where there is a tough layer of vegetation covering the soil. How far the appearance of extensive aqueous erosion may be due to short and very violent outbursts of rain in an otherwise comparatively dry country, rather than to a "pluvial period" is a question worth considering. We know for a fact that even in our own country there have been cloudbursts in the Lake District and mountains of Wales which produced an enormous amount of erosion in the course of a single afternoon and have cut channels so deep that the normal weathering of a century has not sufficed to obliterate or even to soften the gash in the hillside. Most probably the observations in the Sudan which were referred to took full account of

this possibility, and without knowing more than I do about this, I dare say I should not have referred to it. I must again congratulate Mr. Ogilvie on the very excellent piece of synthetic work he has done and on the admirable way in which he has presented it.

Prof. A. J. Herbertson: The type of paper Mr. Ogilvie has given us this afternoon is very valuable. He has not merely summarized the recent literature on the subject, but, as he was prevented from going to Morocco himself, he did the next best thing by consulting the chief authorities in Paris. There are a number of very interesting points arising from the morphology of this region. I have been very much struck by the meeting in Western Morocco of Armorican and Variscan folds; for the junction in France is very much farther to the east. In the south of the Atlas the contact between the great tableland and the folded Mid-World Mountains seems more mixed than at the eastern end of the Mediterranean, in Northern Syria. It would be valuable to have a detailed comparative study of the zones of contact between them in Morocco in the west, in Syria in the east, and in the middle, where apparently a more complex connection exists between the Central Apennines, Southern Italy, Sicily, the eastern Atlas, and the Sahara Tableland.

With regard to the low rainfall to the west of the Atlas I used the late Prof. Fischer's results in making a rainfall map of Africa over a dozen years ago, but I did so with some reservations, because it is quite possible that the steppe character of that region may be due to the soil as much as to the rainfall. If you compare Map I., showing the geomorphology, and Map III., you will notice that the patch of lowest rainfall in the west occupies the eastern half of the Meseta region but avoids the older and harder parts of that foreland. I have to thank Mr. Ogilvie for giving us this very clear account of Morocco, and for suggesting so very many problems which this region presents.

Mr. A. E. Kitson: In complimenting Mr. Ogilvie on his paper I wish to endorse what Captain Lyons has said of its usefulness to geographers who may desire to do further work in Morocco. Brief notes on the geology of the country, given with the geographical description of the different areas and fault lines, would be very useful, and I hope Mr. Ogilvie will include them in his paper. In its late Tertiary elevation the western coast-line of Morocco shows a resemblance to the eastern Guinea coast, but in addition to the two main elevations are there any indications of minor ones of that age, such as is evidenced in Southern Nigeria by coastal plains and entrenched valleys? The marked feature of the Southern Nigerian coast-line is its great delta and its low littoral deposits of sand, mud, and swamp vegetation. While apparently delta deposits of importance are absent from Morocco are there any important littoral deposits, other than river bars, on the Atlantic coast?

Prof. Myres: When I ask Mr. Ogilvie to reply to the criticisms that have been made, I should like, at the same time, to express to him the thanks of the Committee for bringing this material before us and putting it in so compact and useful a form. We have here a particularly interesting region from the geographical point of view, because, to put shortly what seems to me to be its fundamental character, it is an area of which the geomorphology is of the same type as is characteristic of other parts of the Mediterranean region, while it lies sufficiently far west to be exposed to climatic conditions which are far more Atlantic than Mediterranean.

In his first diagram Mr. Ogilvie coloured the Riff series of folds differently from those of the Atlas and indicated important differences in their origin and structure. It would be very interesting if he would work out those differences in greater detail, particularly in regard to their consequences in the surface characters of the two regions. Some of these suggest themselves at once. In a more detailed

geological map, such as that which is appended to M. Gentil's paper, the proportion of the Jurassic surface to the non-Jurassic and pre-Jurassic surfaces of the two regions is very different. In the Riff very much the larger area is pre-Jurassic, and that in itself is an important factor in determining the surface soil and the vegetation of this district. In the same way the area of "irrigable oasis" is extensive and continuous along the mainly jurassic slopes of the Atlas, but (at all events on such condensed maps that we have here) no such feature appears along the foothills of the Riff; and one would like to know how far the detritus brought down by the torrents of the Riff is of a quality inconsistent with the development of any irrigation culture.

One valuable feature of Mr. Ogilvie's paper is that it indicates clearly how slight and provisional much of our knowledge of Morocco is. Even for so fundamental a factor as the rainfall we are still largely dependent upon Dr. Fischer's inferences from the vegetation, very ingenious, and probably in their main outlines, accurate; and there is one point there which at the outset seems to suggest caution. How far has Dr. Fischer's inference from vegetation to rainfall taken account of the very high figures for dew in the non-rainy season, in a very important part of the region? This circumstance, that the total amount of moisture available for plants is not to be directly correlated with the actual rainfall, comes out again if we discuss that curious deposit of black earth on the Atlantic lowland. Mr. Ogilvie made the ingenious suggestion that it was largely due to the decay of the annual vegetation; rather a difficult hypothesis to follow out, though it is not easy with our present knowledge to devise an alternative. It occurs to me, however, that where, in addition to a seasonal rainfall, you have a very copious dew, particularly in the drier parts of the area, the conditions may be favourable for the preservation of the remains of the lowlier forms of plant life, moulds and the like, in a fine soil which seems to be partly loess.

Another point about the water supply is this: how far there is any variety in the water supply of the different oases? Are they mainly, as some of the large ones appear to be from the map, of the Damascus type, where a river coming from adjacent highlands is beginning to spread and lose itself on the edge of a low arid region, or how far, as along the south side of Algeria, are the oases artesian?

With regard to the interaction of climate and structure, what strikes a historical geographer very markedly is that through the circumstance that here a bit of what I might describe as South Mediterranean country runs out into an Atlantic supply of moisture, you probably have the superficial conditions, the unspoiled vegetation and surface covering, more nearly preserved than anywhere else. I have therefore considerable hope that as the country becomes more accessible to the harmless variety of traveller, we may get information, not merely as to the undestroyed condition of such vegetation, but as to the habits of human life which it engenders; habits on which have been based the great Mediterranean civilizations themselves. We have not, of course, in Morocco, what we have further east, the clues as to natural lines of development supplied by the Carthaginian exploitation, which in Tunis did for a while so much good and ultimately so much harm, by destroying the forests and installing that kind of temporary irrigation-culture, the failures of which are so disastrous if, and when, its energy once flags.

Comparing once again Moroccan conditions with those further east, I suspect that torrential rainfall may produce disproportionately large effects even when the total quantity of rain is small. One instance is the observation of the French geologist, Gaudry, in the Vale of Sparta, where in the course of three days he saw alluvium deposited to a depth of three metres ('Animaux fossiles et Geologie de l'Attique' (1862), 450–1). Another comes from Mr. Hogarth in his account of a rain-

burst in Eastern Crete—one of the most graphic descriptions of that kind in recent geographical literature where the whole of a river-valley was altered in the space of a few hours, to the complete destruction of the works of man ('Accidents of an Antiquary's Life' (1910), pp. 79–87). After a single cloud-burst of that kind you practically start with a fresh piece of the world.

And we have not only had material for discussion in this room, but also valuable suggestions for work in the field. If we compare Mr. Ogilvie's bibliography with the recorded visits of travellers of the chief nationalities, I think we shall be struck with the small number of British travellers whom he has found worthy of a place in his list, and I hope that in that respect his paper may mark the turning of a new leaf.

Mr. A. G. Ogilvie: I should like to thank the various speakers for their kind references to my paper. It will certainly give me much pleasure if the paper can be of any use at all in any of the ways suggested. I have listened with great interest to the remarks which have been made, and I look forward to going farther into the subject in the light of those remarks. Dr. Falconer has suggested that I should supplement this paper by a resumé of the geology. This has been so well done in an article by M. Gentil in the current number of *Les Annales de Geographie* that it is quite unnecessary for me, who am not a geologist, to attempt to do such a thing. The dipping of the axis of folding in the Atlas has been thoroughly investigated by M. Gentil, and he points out that in the formation of the Strait of Gibraltar both a dipping of the axis and faulting have played a part.

As regards the effect of folding upon the valleys in the western High Atlas, the map by Gentil in the French edition of Suess's work shows well how the deep gorges follow generally the Variscan direction—doubtless coinciding with the less resistant strata.

I believe geologists have recently shown that traces of Variscan folds occur as far south as Senegal. Gentil believes this system to run north-eastwards through Morocco, but he draws a branch which diverges in the Meseta and follows the Armorican direction to the West Coast.

Mr. Kitson has referred to the nature of the volcanic rocks. Perhaps the most striking volcanic area is that at the junction of the High- and Anti-Atlas. It is shown by Gentil to be a neck of a large Tertiary volcano; but all vestiges of the crater have disappeared.

In discussing the Riff we must remember that only its E. and W. ends have been examined by geologists. The representation of the geology of the interior has therefore been largely inferred from descriptions by other observers, notably from those of de Segouzac.

Remarks have been made about the evidences of a Pluvial Period in the past. Fischer describes the great alluvial or diluvial deposits at the base of the Atlas in his work in Petermann. He shows that they are composed entirely of water-worn material varying greatly in size from boulders to the finest sand, and he suggests that they may be fluvio-glacial deposits of the Ice Age or fluvial deposits of a pluvial period. In the vicinity of the mountains much of the rainfall comes in short thunderstorms which, as Dr. Mill has suggested, can do a great deal of work in a short time in arid climates. No doubt this should be borne in mind in considering the origin of these deposits.

The Tirs is regarded by Fischer as an aeolian deposit, while Gentil believes it to be the residue of the dissolved limestone upon which it always lies. Both authors refer to the decay of annuals as producing the black colour, but I do not remember that either mentions the influence of the humbler vegetable forms which probably are important in this respect.

The chairman has remarked that no zone of irrigation oases is shown on the map in the foothills of the Riff. This part of the map is copied from Fischer, who drew along the Atlas a zone where cultivation is possible only by irrigation. He regards the Riff foothills as within the zone of possible cultivation without irrigation. In drawing the isohyetals of the Meseta Fischer had to depend largely upon the vegetation for the interior, but at the coast, *i.e.*, where the dews are most marked, he had rainfall observations for several coastal towns.

With regard to the type of water supply existing in the oases of the Saharan border. Those on the Draa, the Ziz and the Gir are situated where the streams emerge from narrow valleys in the hills and are beginning to lose themselves in the sand. The oases in Algeria on the eastern border of Morocco, such as Figig and Aïn-Sefra, have an artesian supply.

REVIEW OF THE RESULTS OF TWENTY YEARS OF ANTARCTIC WORK ORIGINATED BY THE ROYAL GEOGRAPHICAL SOCIETY.

By Sir CLEMENTS R. MARKHAM, K.C.B., F.R.S.

THE time has arrived for explaining briefly the plan and objects of the renewal of the Antarctic exploration which I, as President of the Royal Geographical Society, originated in 1893, in concert with my expert polar advisers. For our chosen leader must have reached the South Pole last January, and is on the eve of completing geographical discoveries in the first direction we selected.

The actual knowledge we possessed in 1893 is best explained by dividing the Antarctic region into four quadrants, each having the Pole as their apex, and the Antarctic circle as their arcs:—

90° E. to 180°—*The Victoria Quadrant.*
180° to 90° W.—*The Ross Quadrant.*
90° W. to 0°—*The Weddell Quadrant.*
0° to 90 E.—*The Enderby Quadrant.*

We knew from Balleny, Dumont d'Urville, and Wilkes that there is more or less land along the arc of the Victoria Quadrant, from Biscoe and Kemp that there is land along the arc of the Enderby Quadrant. Ross had boldly forced his way through that close pack which had stopped every one else, in sailing vessels, had sighted the east coast of Victoria Land with its lofty mountains and active volcano, and had discovered the extraordinary phenomenon known as the "great ice barrier." Weddell, in the quadrant which bears his name, had found that the land was not near the arc of that quadrant, but far to the south, not in sight even in 74° 15′; while Biscoe had discovered a long island or peninsula, which was named Graham Land, extending from the Antarctic towards the Andean region. In the Ross Quadrant Cook and Bellingshausen had discovered that there

also the land was far to the south of its arc, not to be seen in 70° or in 71° 10′ S.

It was clear that there existed a great Antarctic land mass, extending to beyond the Antarctic circle in the Victoria and Enderby Quadrants, but receding far to the south in the Weddell and Ross Quadrants. It was no use to potter about any more round the Antarctic circle either in sailing vessels or steamers, merely to sight land or think it is sighted. Ringgold's Knoll is a warning. There are perhaps more than one Ringgold's Knolls. But it is desirable to revise and extend the old work, provided that it is done by wintering and with travelling parties; and this is what Mr. Mawson has undertaken with regard to the arc of the Victoria Quadrant. Similar work should be done along the arc of the Enderby Quadrant.

Our conclusion was that future Antarctic enterprise must be devoted :—

1. To exploring the Antarctic land mass by landing and by sledge parties, to ascertain its geographical features, the character of its glaciation, its geology, and its physical phenomena.

2. To ascertaining the outline of the Antarctic continental lands, and, above all, whether they consist of one or two or more land masses.

For these objects the course must be south, in the direction of possible openings, so as to land as near the heart of the unknown region as possible. One such opening, the most important one, had been discovered by Sir James Ross in the Victoria Quadrant. A second had been indicated by the *Challenger* east of Kemp Land, where in 66° 35′ S. there could have been no high land within 60 miles, while the absence of icebergs led to the conclusion that a high latitude could be reached on meridians between 70° and 80°. To the east of Graham Land, and where Weddell reached 74° 15′, another opening may be found. In the Ross Quadrant the land is also far to the south, and it would be a hazardous undertaking to attempt to force an opening near Cook's furthest. These then are the canons of Antarctic exploration which we established for the guidance of organizers :—

1. Valuable results can only be obtained by landing, and by sledge travelling.

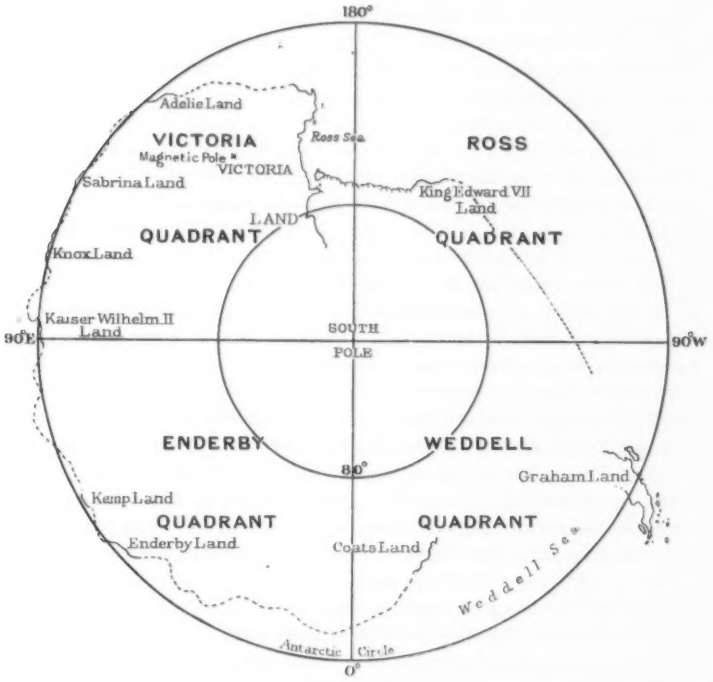
2. A main object must be to ascertain the conformation of the Antarctic land.

3. Openings must be forced through the ice pack, and far southern coasts must be reached for landing.

We relied upon the great advantage that steamers have over those old sailing vessels, by which all former Antarctic discoveries had been made. I had myself served in the first polar expedition in which steam power had been efficiently used, and I had served in an Arctic sailing vessel. I had seen both steamers and sailing vessels in ice navigation. The difference is very great. A steamer can more quickly take advantage of a lead or opening, can force her way more easily through ice which is not too closely packed. But there are limitations. When once beset, or against solid

floes, a steamer can do no more than a sailing vessel. However, we placed great reliance on steam power for forcing a way through ice pack floating northwards.

Of the four possible openings we selected the one discovered by Sir James Ross, for the first expedition of the two great Societies, as the only one that had been forced, and as the most certain to lead to valuable results. Never was an anticipation more fully confirmed. A talented and highly recommended naval officer was carefully selected to command



the expedition, in the person of Captain Robert F. Scott, R.N. He made himself master of all that had gone before, both in the Arctic and Antarctic regions, especially as regards sledge travelling. He forced the good ship *Discovery* through the pack in the footsteps of Sir James Ross, and established winter quarters in the far south. Captain Scott is the creator and founder of Antarctic sledge travelling which differs in several respects, owing to different ice and other conditions, from Arctic sledge travelling. He organized an admirable system down to the minutest detail. He carefully examined and surveyed the great ice barrier including soundings. He discovered the very important land mass, which was named "King

Edward VII. Land." He made a memorable sledge journey to the south, and another more remarkable one up the Ferrar glacier and over the ice cap to a great distance, by his observations fixing the position of the magnetic pole. He brought to our knowledge the existence of a lofty range of mountains extending for certainly 500 miles, cut by ravines occupied by glaciers, and consisting of limestone with overflows of basalt, the limestone presenting horizontal structure without any lateral pressure. He discovered the island formed by Mounts Erebus and Terror. He discovered the interesting phenomena connected with the receding of Antarctic land ice. His zealous and loyal officers and men took continuous observations in all branches of physics. Twelve volumes of valuable scientific work form the imperishable monument of the results of this great and admirably conducted expedition. It more than justified the canons we had laid down for Antarctic discovery.

But the work, even though it was resolutely prolonged through two winters, could not be completed by one expedition. The Victoria Quadrant, which Captain Scott had made peculiarly his own, had to be explored to its very apex, which happens also to be the south pole; and further geological research was needed, without which the position and age of the limestone formation remained unknown.

It was always Captain Scott's desire to complete the work so admirably commenced, as soon as the exigencies of his profession would admit of his sparing the time. Accordingly he and his colleague, Lieut. Evans, raised the funds and organized a second expedition to complete their exploration of the Victoria Quadrant. The *Terra Nova* sailed in June, 1910, with the best equipment for scientific work that ever entered the polar regions. We have just received an account of the first season's work. Captain Scott, in his southern journey, had reached 87° 32′ S. and will have been at the south pole on about January 14. His journey, without the aid of dogs or ponies, from the foot of the glacier to the pole, is by far the finest in the annals of polar discovery, equalling those of McClintock and Mecham as regards distance, and exceeding them as regards difficulties overcome. Two ably conducted geological parties had found fossils, which was one of the greatest Antarctic desiderata. The winter journey of Dr. Wilson to Cape Crozier was magnificent. But our gallant countrymen are still in the midst of their work.

After I had originated the idea of a renewal of Antarctic discovery several private expeditions were started, Belgian, German, Swedish, Scottish, French, but none of them were of any use as regards Antarctic discovery. I fully appreciate the value of their work as regards deep sea soundings, meteorology, magnetism and biology in the South Temperate Zone, and the researches of Nordenskiöld and Gunnar Anderssen are of the highest value, indirectly throwing some light on the Antarctic problem. But the mere sighting of land at a distance without exploring, the mere rushing to the pole with that as a sole object, are of no use from my point of view.

We have seen that Captain Scott is now completing his work in the Victoria Quadrant. The opening of next importance is that by the Weddell sea and the east side of Graham Land. Some good work had already been done in that direction by Captain Larsen as long ago as 1892, who had landed, made valuable observations on the character of the glaciation, and collected some fossils. His services to Antarctic discovery have never been appreciated as they deserve, though he received one of our minor awards. The Weddell opening has now been undertaken by Captain Filchner with a German expedition, on correct principles. His object is to explore by landing in accordance with the canons we laid down for Antarctic discovery. Captain Scott gave him all possible assistance in his preparations, and as he has undertaken to do the right thing in the right way, he is fairly certain to achieve a measure of success.

The *Challenger* opening in the Enderby Quadrant should be examined though its existence is doubtful.

But the chief work that remains for future explorers is the exploration of the Ross Quadrant, and the detailed examination of the region from King Edward VII. Land to Graham Land. There will be great difficulties, and the work will need another well-equipped expedition, if not two. But the results will be of extreme interest. Nordenskiöld has proved the continuity of Graham Land with the Andes, probably in Jurassic times or later. Both Patagonia and Graham Land are much disturbed and contorted geologically. If King Edward Land is found to be the same, the conclusion is obvious, for the Victoria mountains present horizontal structure without any lateral pressure. I had some conversation with Mr. Mawson on this point, who quite concurred in the great importance of researches in this direction. They may connect King Edward Land with Filchner's possible discoveries. The questions of the Ice Barrier remain to be solved, and Captain Scott may safely be relied upon to solve them. Assertions about mountain ranges seen at long distances are of little or no value.

The attention of all who are interested in Antarctic discovery ought not to be diverted from our gallant countrymen, who have already achieved such great success, and are preparing for still greater efforts in the coming season. They are not the men to scamper to the pole and scamper back for the reward. Their watch-word is "thorough." Captain Scott tells us, "I am remaining in the Antarctic regions for another winter, in order to continue and complete my work." He, with his old comrades Dr. Wilson, Lashley, Evans, and Crean are entering upon their fourth, Williamson on his third, the rest on their second Antarctic winters. Let the warm and cordial sympathy of all geographers be with them, and continue with them until their return. True explorers, true representatives of the great British discoverers of times gone by, they are working with single-minded zeal and no thought of reward, for the honour of their country.

ANTARCTIC WORK REMAINING TO BE DONE.

Victoria Quadrant.—Completion of an examination of the east side of the Victoria Land and the great ice barrier by Captain Scott's expedition next season.

Re-survey of the land reported by Balleny, Dumont d'Urville, Wilkes, and Drygalski, undertaken by Mr. Mawson's expedition.

Ross Quadrant.—Exploration of the west side of King Edward Land.

Discovery of the Edwardian coast from King Edward Land to Graham Land.

Enderby Quadrant.—Investigation of the opening reported to be probably to the east of Kemp Land.

Survey and examination of Enderby Land and its continuation to the westward.

Weddell Quadrant.—Completion of the discovery of the coast of Graham Land on the east side.

Penetration through the pack to the south of Weddell's furthest and discovery of the land far to the south. This has been undertaken by Captain Filchner.

THE BRITISH ANTARCTIC EXPEDITION.

THE following letter from Dr. Edward A. Wilson, Chief of the Scientific Staff of Captain Scott's Expedition, has been received by Sir Archibald Geikie, President of the Royal Society. It is dated "British Antarctic Expedition, McMurdo Sound, October 31, 1911."

"This is the last opportunity I shall have for sending any letter home by the Terra Nova when she comes to us in January. She will leave again early in March, almost certainly before we can return from the long sledge journey South on which we start to-morrow. We shall almost certainly be away for more than four months, and it follows that we have prepared to remain here for another year. If when we arrive back from our journey over the Barrier we find that the ship has gone home, we shall, of course, receive our mails, but we shall be unable to send any replies or news as to the result of our summer's work, unless, as we hope, it may be possible to send it rapidly forward by dog-team in time to catch the ship. I know you will be interested to hear something about the work which has been done here during the winter. You will already have heard what was done up to January, when the ship returned to New Zealand with all our news.

"The following is an epitome which Captain Scott asked me to make out, in as short a form as possible. It may appear in the Press

cablegram—or it may be much condensed. I will repeat it here and add such notes as I think will interest you, which will not be cabled.

"The self-registering meteorological instruments have given a continuous record of pressure, temperature, wind velocity, and direction; and these records have been checked every four hours by eye observations. A pressure-tube anemometer has given interesting records which will throw light on the character of Antarctic winds. The upper atmosphere has been investigated by means of small balloons, which have shown the direction of upper currents to a height of 6 miles and the temperature up to $1\frac{3}{4}$ mile. An almost unbroken record of the magnetic elements has been obtained, and absolute magnetic observations have been made every week. All through the winter the aurora was observed every hour, but very few brilliant displays occurred. Atmospheric electricity has also been studied. Ice work and physiography have afforded much field work. Land forms now appearing in fresh state with receding glaciation are being studied in relation to similar time and weather worn structures of other parts of the world. The discovery of evidences of interglacial period of vulcanicity gives additional interest to the study of this volcanic region. The mainland offers a rich field for petrology, with abundance of mineral-bearing quartz veins, but no economic mineral yet found; at winter quarters an excellent field for work on ice in miles of glacier front. The hut stands on a cape formed largely of massive moraine with lava-flows from Erebus. Pendulum observations for value of gravity have been carried out. A tide gauge has given a continuous record. Marine biological work has been carried on throughout the winter at a hole kept open in the sea-ice for nets, water samples, and sea temperatures. Quantitative and qualitative observations of minute organisms at various seasons give interesting results. The parasitology of all the seals, penguins, other birds, and fish available has already given good results and some new protozoa have been found.

"That, then, is a very epitomized account of what has been done, and it covers a very solid lot of work—not in any sense exciting, but I am sure it is sound. Simpson has been responsible for the meteorology, the magnetic work, and the atmospheric electricity. We are badly placed for aurora, unfortunately. His upper atmosphere balloon work has been most interesting. Wright, apart from taking pendulum observations and some estimations of sea-water radio-active content, has given his whole time to the study of ice in all its bearings. And it is with a view to seeing the Barrier and something of its entering glaciers and the high level inland ice-cap that he accompanies us on the journey South. He is a splendid worker; but I can say the same for every one; they have all worked really well and they are all keen for more. Taylor has done fine work as physiographer and geologist, and unfortunately has to return to Melbourne, as he was only given a year's leave by the Government Meteorological Bureau, and his leave is up. Debenham has been doing the petrology and

the stratigraphy, and remains another year with us to make a special study of Erebus and Terror. Nelson has been busy with the marine plankton, chiefly in connection with hydrographic changes, salinities, minute changes in temperature, light, and so on. I think he will have some interesting results. So will Atkinson, whose work here on the parasites of all the larger animals will contain a good deal that is new. No one has touched the protozoa here before, and he has already got several new things both in protozoa and in ecto- and ento-parasites. My own effort in mid-winter to get to the emperor penguins at a time when their eggs would provide embryos fit for cutting turned out to be exceedingly difficult, but we succeeded in getting three different stages back, which, I think, will prove to be of some interest. We shall make the rookery another visit next spring. We find they lay their eggs actually before mid-winter's day, even earlier than we thought.

"I am afraid I shall be writing more than you will care to read if I go on, but that really gives a general idea of our work. We have still heaps to do—and every one is anxious for another year to do it."

THROUGH THE LUTZU COUNTRY TO MENKONG.

By F. KINGDON WARD, F.R.G.S.

For the past few years, events to which Mr. Archibald Rose, C.I.E., lately drew earnest attention, have been transpiring on the north-east frontier of India where two great Empires meet. It may, therefore, be opportune to say something of a journey on the China side of the frontier, undertaken before the revolution broke out, at a time when the fringe of Celestial outposts who have been gradually pushed westwards, were at the height of their activity.

Where far western China abutts against Tibet on the north and Upper Burma on the south, three great rivers have been pinched up together in the mountains, and run parallel to one another in a belt of country scarcely 50 miles wide, and these rivers, the Salween, Mekong, and Yangtze, are in the nature of vast gutters, draining the Roof of the World.

Entering Yunnan province by the well-known road from Bhamo, I went eastwards to Tali-Fu, crossing the Salween and Mekong *en route*, and thence turned northwards. The Yang-tze is reached just where it makes its great bend to the east, after which the road continues north-westwards, and we get back to the Mekong valley, 32 mule-stages from Bhamo. Thenceforward the main road runs almost due north through A-tun-tsi, and so to Batang, 49 mule-stages from Bhamo, where it joins at right angles the main road across China and Tibet to Lhasa.

I spent seven months wandering between these three rivers on the

China-Tibetan frontier last year, with A-tun-tzŭ on the Mekong for a centre, and the following paper deals with a short journey westwards into Tibet.

The physical barrier to be surmounted in the case of a journey from the upper Mekong to the Salween presents less difficulty than the political obstacles placed in the way by zealous mandarins. In an interview with the official at A-tun-tzŭ, however, I obtained permission to return to Tsu-kou, three days south of A-tun-tzŭ, and once there we lost no time in crossing the mountains to the Salween.

Our party comprised six Tibetan porters, a Tibetan interpreter and guide, my Chinese servant, a watch-dog, and myself; two ponies and a donkey, in charge of a woman, were to accompany us for the first two days to carry food for the men, and on the afternoon of June 7 we started up the mountain in the rain.

Ascending through pine forests interspersed with cultivated slopes, we reached the last Tibetan village, situated just below the first pass, perhaps 2000 feet above the river, and spent the night there. It rained incessantly, continuing all the morning, so that in view of the slippery nature of the path, it was impossible for the men to proceed; but towards the middle of the afternoon the rain ceased, and crossing the low barrier range or spur through which the torrent, flowing in its deep gorge, had bored its way to the Mekong, we descended through dense forest to the stream side. Here, instead of the cultivated slopes and open pine woods of the main valley, magnificent forests of fir and giant rhododendron, with a dense undergrowth of deliciously scented lilies, spotted arums, and delicate ferns, greeted the eye on every hand; but the going down the steep and narrow jungle path was very bad.

After descending some hundreds of feet to the stream, we began the ascent of the ever-broadening valley, and it was dusk when we eventually reached a small and unoccupied log hut; the forest, consisting now chiefly of grand old birches and alders, was here more open, the undergrowth, correspondingly more dense.

All night long it poured with rain, dripping through the hut and soaking everything, but shortly after breakfast the weather cleared, and having sent back the animals, we started for the pass. We soon emerged from the forest, which no longer occupied the valley bottom to any extent, though the immediate mountain slopes were forested for another 2000 feet or more—a phenomenon perhaps due to the gradual concentration of the winds sweeping down the open valley floor.

Crossing the torrent again and again, by wading, over crazy tree-trunks, and finally across a snow bridge, we ascended gradually till the mountain wall in front came into full view, and we stopped for lunch just below the snow.

The alpine flowers spread out between clumps of bamboo brake and scattered fir trees were a wonderful sight to behold, the glorious sulphur-

yellow poppy, Primulas, blue and purple, violet Columbines, crimson rhododendrons and many others, forming sheets of colour. Here and there alluvial cones had been washed down from the mountains blocking small streams, which had consequently formed bogs, where, I believe, a very good peat might be dug.

The Sie-la, as the Tibetans call this pass, is rarely open before June, and we were one of the first parties to cross; the snow was deep and soft, there was no trail to follow, and the porters frequently sank in waist-deep, having to be extracted by their companions. However, one by one we reached the summit which, by means of a rough boiling-point reading, I calculated to be about 14,000 feet. The Sie-la is a mere notch in this mountainous wall of rock, and the snow was banked high at the summit, though on the other side, which was terrifically steep (whereat I was very glad we had not brought the animals), there was no snow till we got down to a single large drift far below. When we crossed this same pass on November 11, wrapped about by freezing mists, and stung by the whirling ice-spicules whipped up by a raging wind, the snow was far deeper on both sides, and the natives were of opinion that no one else would get across that year.

The Sie-la has been crossed by several French army officers, by Mr. Nicolls, an American journalist, and by M. Bacot; the intrepid Catholic priests on the Mekong and Salween rivers frequently make the journey in all weathers.

We now descended into a deep valley trending south-south-west, more or less parallel to the Salween itself. In that region of the upper Salween, which is under the influence of the monsoon rains, the tributary streams flowing from the eastern watershed usually flow from their source for some distance parallel to the main river, so that a tiresome succession of deep valleys and high spurs have to be crossed when traversing the watershed from east to west.

Towards sunset we reached a second log hut surrounded by high alpine meadow, amongst which my guide pointed out several leaves and roots which the Tibetans eat, besides bringing in an armful of toadstools for my supper. This man, Gan-ton by name, was quite a wonderful person in his way, a Catholic Tibetan who spoke Chinese and Lutzu fluently, and both Moso and Lissu sufficiently well to make facetious remarks to any tribesmen we met; but he did not take his religion very seriously.

On the following day we continued westwards, and from the pass over the next spur, obtained a good view right across the Salween valley towards the headwaters of the 'Nmai-kha. Trending north and south immediately above the Salween was a snow-clad range, the glaciers descending from the highest peak being plainly visible.

From the views I obtained of this range in November, however, I do not think it is covered with perpetual snow for any great distance south of

NOTE.

This map is from a rough sketch supplied by Mr. F. Kingdon Ward, adjusted to sheet No. 21 S.E. of the Survey of India N.E. Frontier region, 1 in. to 4 miles, and to Captain F. M. Bailey's position of Menkong. (Geographical Journal, April, 1912.)

T'sam-pu-t'ong, though it doubtless runs northwards as far as Menkong before merging into the Tibetan plateau.

The magnificent peak rising immediately behind T'sam-pu-t'ong is called by the Tibetans Ke-ni-c'hun-pu, and I believe that the 'Nmai-kha has its source in this range, possibly from these very glaciers. There appears, in fact, to be a big snow-clad bluff terminating the Tibetan plateau, and stretching westwards in unbroken grandeur to the Assam frontier, on the southern face of which rises the 'Nmai-kha, and perhaps also the Mali-kha, while its eastern and western slopes, I believe, separate the waters of the Salween from those of the Brahmaputra system.

For the next two days we made only half stages on account of the appalling rains, and crossing the last spur, found ourselves on the evening of June 12 at the Lutzu village of Cho-la on the left bank of the Salween.

The Salween is here considerably bigger than the Mekong, and flows in a U-shaped valley as opposed to the V-shaped gorges of the latter, plainly the effect of the heavier rainfall. Comparatively broad terraces, cultivated throughout, and dotted with villages, extend from the mountain foot to the river-bank, or slope fanwise from the gulley mouths to end abruptly in a high bluff, being cut off sharply by the river flowing below.

The huts, which are, as a rule, widely scattered, comprise one or two rooms built of pine logs roughly dovetailed into each other at the four corners, their ends projecting several inches, and a ridge pole supporting cross-beams which rest directly on two walls; the roof itself consists of wooden shingles kept in place by large stones, much after the fashion of a Swiss chalêt, and the gable ends are either left entirely open, or partially filled in with bunches of dry bracken. There is no chimney, the smoke from the fire in the middle of the room finding its way out between the chinks in the wall or through one or two windows cut out of the logs. Frequently the building is supported on piles, or built against the edge of a bank so that the space beneath can be used for a cattle-byre; and since there are no floor boards, a rich smell of cattle, pigs and hens finds its way up between the logs. The "black" Lutzu of the arid region, however, have copied the Tibetan style of architecture, building two-storied houses with flat roofs.

The Lutzu are essentially an agricultural people, though they also do a little fishing. They carry on no trade with their neighbours, being in the enviable position of having everything they require, hemp for their clothes, which are woven by the women, tobacco, maize, rice, buckwheat, apples, oranges, and so on; bamboos and gourds supply them with water-vessels, and with the cross-bow they shoot big game and birds. Though not a drunken people, they certainly drink very large quantities of liquor made from fermented maize; but this beverage, which is of the consistency of thick pea-soup and is taken warm, is probably more nourishing than inebriating. In the winter men and women sit round the fire for hours at

THE SALWEEN-MEKONG DIVIDE, SEEN FROM BELOW THE SIE-LA.

MENKONG, CAPITAL OF TSA-RUNG, TIBET.

WOMEN AND GIRLS OF THE "BLACK" LUTZU TRIBE.

THE SALWEEN IN THE ARID REGION, TSA-RUNG.

a time drinking, chatting, and smoking; it is meat and drink and medicine to them, and by no means unpalatable.

Sometimes two young women would take up a single bamboo cup, and putting their heads close together, quaff simultaneously from it; and judging by the sly laughter with which this performance was always greeted, I was inclined to attach some unknown significance to the action.

The men wear their pig-tails down, not bound on top of the head as do the Tibetans, and their dress, though simple, is not unpicturesque: short breeches (undoubtedly copied from the Chinese), and shirt of white hemp-cloth trimmed round the collar and sleeves with light blue, and strips of cloth wound loosely round the calf, like puttees. On the other hand, many of them have copied the Tibetans and wear only a long cloak tied up round the waist to form a skirt, though this style is chiefly confined to the "black" Lutzu, of whom more anon.

As to the women, some of the younger girls before child-birth are extraordinarily handsome—I have seen Lutzu maidens who would put to shame Cornelia, Queen of Italy. Their complexion is lighter than that of the Tibetans, but not so sallow as that of the Chinese, the features are regular, the nose well bridged, the eyes large and round, the high cheek-bones scarcely prominent. They wear a single long-sleeved garment usually of dark blue cotton cloth, reaching below the knees, and tied round the waist; commonly a hempen cloak, extending across the chest from the right shoulder to the left arm-pit, so as to hang in loose folds over the body, is added. Those who wear pig-tails usually bind them round the head after the style of the Tibetan women, but there is very little jewelry worn.

Their religion is a modified form of Lamaism, but I believe that this has been grafted on to a much older religion, perhaps not propitiation, for, in common with the Lissu, Moso, and other tribes, they hang up corn cobs in their houses, which are, I think, offerings to the *penates*; this practice is not observed by the Tibetans at all.

How far their Buddhism differs from the exotic form common in Tibet I cannot say, for the only rite I ever saw any one perform was when the young lady of the house took up a jug of water and made the sign of the cross over the household fire, by throwing water across it to north, south, east, and west. She did it in a very business-like way, just as she might have fed the chickens, the first shower hitting the wall behind, and the last one drenching me.

Meanwhile I had got busy with my medicine chest, as the people flocked round, mothers with babies at their breasts, young men and maidens, and we did something for them all—harmless but effective tabloids and faith for those whose ailments I could not diagnose, quinine or santonin for the more obvious weaknesses of the flesh. My medicine chest was indeed a passport amongst these tribesmen.

On June 13 we crossed the Salween in dug-outs, the river being some 40 yards wide, with a rapid current. Continuing a few miles up the right bank, we reached the village of T'sam-pu-t'ong where there is stationed a small Chinese official with ten or fifteen soldiers. This gentleman requested me to return to A-tun-tzŭ by the direct road, and on no account to cross into Tsa-rung, "because," as he remarked, "the roads are very bad"—the usual formula; and to ensure my following his advice he detailed two soldiers to escort me on the morrow.

Immediately above T'sam-pu-t'ong the character of the valley began to change, and, though we were not yet out of the rainy region, we were happily favoured with a glorious day. In a splendid limestone gorge through which we passed the effect of the heavy monsoon rains was still very apparent, forests of straight-limbed strapping trees, many of them covered with epiphytic ferns and orchids in great variety and a tangle of creepers, here clothing the cliffs and gullies in wonderful profusion.

Presently we recrossed to the left bank by a rope bridge, and finally ascended a broad valley to the east.

One peculiarity is to be noted about these rope-bridges. The Lutzu, when crossing, always carry with them a bamboo tube filled with water, which they tilt over the rope just in advance of the slider, thus reducing the friction and consequently the wear and tear on the rope. I believe the single-rope bridge, sometimes regarded as a Tibetan invention, to be merely the practical application of the natural liana bridges doubtless to be found in the jungles of Upper Burma and Assam, and carried eastwards by emigrating tribes from those regions.

Let us also remember that the Lutzu carry their loads by means of a strap passing round the forehead, as do the Lissu, Kachin, and other jungle tribes, but not the Tibetans. This is, indeed, typical of dwarf races, and though the Lutzu are not dwarfs, they are conspicuously short of stature. It is, indeed, difficult to escape the conviction that they are a jungle people in a comparatively advanced state of civilization owing to contact with Chinese and Tibetans; their use of the cross-bow, pre-eminently a jungle weapon for jungle warfare owing to its short range and diabolical effectiveness, their gourds and bamboo tubes and rope bridges all suggest as much.

That the Lutzu have come into the Salween valley from the north, representing one of the links left behind in a chain of emigration in that direction, I think very improbable. Rather do they represent an irruption of tribes from west to east, the possibility of which we are apt to overlook in this, the one corner of Asia, where a north and south emigration on a large scale has obviously taken place.

To get rid of my soldiers, whom I did not wish to accompany me into Tsa-rung, I told them that I was stopping a week at Kun-a-tong to collect plants, and they had better return at once to T'sam-pu-t'ong. They started back the same evening; but in the night I changed my mind, and decided

to go straight on. Unfortunately, it was now necessary to make a two days' *détour* back into the mountains, on account of some impassable gorges through which the river sawed its way; a narrow path said to traverse these gorges was now under water, but might be negociated during the winter, they told me.

After another long day's climb in pouring rain, the valley gradually contracting to a densely forested gorge, we stopped under a towering limestone cliff, the men sleeping round the fire under the rock, while I had my tent pitched amongst the dripping vegetation; and on the whole I had the worst of it.

Next day I felt sick and quite disinclined for the long climb in the rain to the crest of the spur; but we eventually reached the summit, and descended once more to the Salween, the Lutzen coming out to meet us and escorting us to their village. But what a change! Their hair, cut in a short fringe over the forehead, hung in tangled masses over their shoulders; their clothes consisted of a single garment, either an untanned goat-skin worn inside out, or a coarse hempen cloak tied round the waist, such as the Tibetan wear; and they were, without exception, filthy.

This marked change in the people corresponds to a marked climatic change, and it occurs in almost exactly the same latitude as a similar climatic and racial change on the Mekong. We were now on the edge of the arid region; and only a few miles to the north the Lutzu finally give place to the Tibetans. The "black" Lutzu, as we may call them, probably owe their uncouthness to a combination of causes, of which the inability to cultivate rice, and their complete isolation from Chinese influence, together with the proximity of the Tibetans, are contributing factors.

On June 17 we reached the last Lutzu village a few miles higher up, the river now flowing through a succession of barren gorges, where none but goats could find sustenance. Here we embarked in a dug-out for a voyage through some of these gorges, and an interesting voyage it proved. This dug-out was only 24 feet in length, about 18 inches in the beam amidships, and the same in extreme depth, though there were twelve of us on board, besides the dog and luggage; we squatted on our haunches in single file, there being five paddle-men forward and a single steersman aft. Our gunwale was almost awash, and, considering the water we had to go through, I frequently thought we must capsize. The men hugged the walls of the gorge most of the time, pushing against the rocks with their paddles, then darting across the river to avoid a rapid and catch the back-current; whenever shingle islands or a shore-line appeared, they got out and tracked, and in this way we covered several miles till we came to the first Tibetan village, and finally disembarked. The last I saw of the Lutzu, they were drifting down-stream in the canoe, sweeping a V-shaped net supported between two long bamboos under the water; the legs of the V were then opened widely, closed together again, and the net, with its enclosures (if any), brought to the surface.

There was no hint of rain now; it was a glorious evening, and a scorching wind raged up through the gorges, which grew more and more wild and lifeless. We did not reach our destination till nine o'clock, but it was a brilliant star-lit night, beautifully warm. La-kor-ah consists of three huts and a small temple, beside which the tent was pitched. Immediately below, a grey glacier torrent came booming through a deep sword-cut in the mountains and sweeping down into the mighty Salween was instantly engulfed in a surge of yellow water; up this narrow rift lay the pilgrims' road to sacred Do-ker La. Here I learned that the French explorer, M. Bacot, was at Menkong with a large number of mules, and I looked forward to meeting him; but in this country one rarely hears the truth of a story the first time of asking.

Next day's march, through an arid and totally uninhabited stretch of the valley, was a trying one. The river swept in huge S-shaped curves round colossal buttresses, smashed its way through deep gorges, and roared over the boulders. Immense screes, sometimes smoking with the dust of falling rocks, rose bare and lifeless on either hand, and a scorching wind, which seemed to suck the vitality from everything, blew throughout the day with ever-increasing violence.

Under that incandescent sky, stretched like a ribbon of fire up the valley, the place became an oven, but on the mountains to east and west, buried in cloud, rain, rain, rain! However, from the village of Chia-na we watched the sun sink, in a wild blaze of colour, behind Menkong, now only a few miles distant. Above Chia-na a narrow stony valley to the east pointed the way to a second pass over the Mekong-Salween divide. It was down this valley that Captain Bailey and Mr. Edgar had come from Y'a-k'a-lo, so that for the last 8 miles up the Salween, from Chia-na to Menkong, I was following in their footsteps. We reached the capital of Tsa-rung before midday, and, leaving the men to fix the camp, Gan-ton and I crossed by the rope bridge to the right bank.

Menkong is built on an alluvial fan washed out of the mountains by two converging torrents, and ending abruptly above the river in a bluff about 600 feet high. The Salween, here flowing in a deep trench and almost continuously interrupted by rapids, certainly discharges a considerably greater volume of water than does the Mekong in the same latitude. Scattered down the slope are the big two-storied "farm" houses, standing amongst fields of waving corn, and shaded by magnificent walnut trees; the contrast between the golden barley and the olive-green foliage was delightful.

The red and white lamasery, its peaceful courts sheltered beneath sombre *Arbor vitæ*, stands on the slope below the fir forests, and westward the neglected road winds away over the mountains to the plains of India. From the officer in charge of the garrison, I learnt that we had reached Menkong exactly a week too late to meet Captain Bailey, who had just started for India by this road, and Mr. Edgar, the English missionary at

Batang. M. Bacot, who in the previous year was, I believe, the first European other than the Catholic fathers to reach Menkong, was not there at all; the mistake as to who was the mysterious European at Menkong arose from the fact that Captain Bailey and M. Bacot possess the same Chinese name. On the two following days we retraced our steps down the valley to La-kor-ah, where we arrived on Coronation Day, and on June 22 we took the pilgrims' road eastwards, reaching the village of Aben at midday; for a week we had tramped beneath this flaming sky, between brazen valley-walls raked by a hellish wind. Abruptly the weather changed again, and ere we had surmounted a wonderful gorge, only to drop down beside the torrent later, the rain was once more drenching us through and through.

Camp was pitched beneath a high cliff, but there was no room to put up the tent, and we huddled as closely as possible under the rock-wall to avoid the rain. Next day we had a long and tiring climb through the dripping jungle, eventually bearing away to the south-east for Do-ker La.

At the head of the valley we were ascending, due east of the Salween, the glaciers of K'a-gur-pu, from which this torrent rises, showed up occasionally through the driving mists. The course of this stream has certainly been drawn wrong hitherto, since, in order to account for its size at La-kor-ah, it was necessary to place its source much further south; but the terrific peak of K'a-gur-pu, with its great glaciers and snowfields, had been neglected.

Camp was pitched in the forest again, at an altitude of about 10,000 feet, and as I was now reduced to *tsamba* as the staple article of diet, I sent Gan-ton out into the jungle to see what he could procure. He came back with some toadstools and bamboo shoots, the latter being roasted by the simple expedient of throwing them into the fire and leaving them till, on stripping off the outer burnt leaves, the inside was found to be soft and succulent.

June 24 was our last heavy day, but I now felt very weak. Gradually we emerged from the forest into an alpine meadow covered with beautiful flowers, and stopped for lunch beneath some big boulders amongst patches of snow. Suddenly there came a hail from one of the Tibetans just outside our little shelter, and everybody rushed excitedly for the open and climbed on top of the boulder; sacred Do-ker La had become momentarily visible through the clouds.

A steep climb brought us at length to the pass, which was now just clear of snow, though I think it is a few hundred feet higher than the Sie-la. A driving wind beat the cold rain in our faces, chilling us to the bone, and nothing being visible of the surrounding mountains save tantalizing peeps which were sufficient to prove that there was much behind the veil of clouds, we did not remain long on the summit.

So this was Do-ker La! A big cairn, into which were thrust many bamboos gay with fluttering prayer-flags and paper strips, was the only decoration,

though hundreds of pilgrims on their way hither passed through A-tun-tzŭ in the autumn.

Down below we crossed a big snow-drift, and after an extraordinarily steep descent reached the valley in which flowed a big stream, obviously another of the glacier streams from K'a-gur-pu.

This immense triple-peaked massif is situated almost immediately opposite the great snow mountain overhanging T'sam-pu-t'ong, and the two of them correspond in position to the line of junction between the rainy and arid regions of the Mekong and Salween valleys, so that it is evidently these peaks and the northward extension of the two ranges at a great elevation which form the remarkable rain-screen in these regions, whereby the Mekong-Yangtze divide has its rainfall cut off and the snow-line suddenly elevated to something like 19,000 feet.

The descent down this valley was through forest similar to that on the other side; gradually we got down out of the rain, and when we pitched camp for the last time there were stars shining overhead.

At the village of Londre, a little above the Mekong, we were told that two Chinese soldiers had arrived on the previous day in search of us, but instead of crossing to the Salween by the Do-ker La, they had gone over the main pass between the Doker-la and the Sie-la.

That same evening we reached the Mekong after a journey lasting nineteen days. There was an interview with the official when we got back to A-tun-tzŭ two days later, but I believe he was genuinely pleased to see us safely back, though he gave a certain amount of trouble when we returned to the Salween in November.

BUSHMAN PAINTINGS IN THE MA-DOBO RANGE ("MATOPOS"), SOUTHERN RHODESIA.

By R. N. HALL.

HAVING just returned from a six weeks' tramp, with my tent and boys (Makaranga), in the remoter parts of the Ma-Dobo range (incorrectly styled "Matopos"), I fancied the Fellows of the Society might like a few words describing some points of what must prove to be a very valuable and an unique discovery.

Only six caves with paintings were previously known, and but three of these had ever been described and that but partially. These six included the "World's view cave." But it is now evident that the "World's view" paintings are far excelled in the number of objects portrayed, in their variety, in their size as heroic pictures, in the number of different colours introduced in depicting one object, and what is more important, in the higher conception, the greater skill and freedom, and more artistic taste, by the paintings in the majority of the thirty

BUSHMAN PAINTINGS IN THE MA-DOBO HILLS (MATOPOS), REDUCED TO ONE-HALF.
(THE ORIGINALS ARE COLOURED REDDISH-BROWN.)

additional caves which I have just discovered and located on my chart of this range.

To these thirty new caves and shelters must be added fully a hundred sets of newly-discovered paintings of the *Beispielen* order, that is, a few objects only on isolated rocks on the open. Some of these show unique examples of considerable artistic merit; the discovery of *Beispielen* paintings in any number in any locality point to the existence of a large central cave with paintings being present somewhere in the hills of the vicinity.

The enormous size of the animals—elephants, giraffes, rhinoceroses, lions, antelopes, and snakes,—is astonishing, some being as much as 8 feet and 10 feet wide and long, and not a few of them are painted high up in the concave roofs of the caves. It is relatively easy to paint an animal correctly in miniature, but it is a test of artistic skill to produce such in heroic size, and yet show muscle, tendon, and pose, and an absolutely correct outline, true to form, habit and movement. A shoal of seven large fishes is ideal. Snakes are numerous, and all have giraffe-shaped heads, and vary in size from 3 feet to 15 feet in length. Several have humps along their backs on which are painted baboons, buck, men, and what must be mythological creatures. Four colours are introduced into one large snake—red, white, yellow, and purple, while in another are five colours—purple, yellow, red, brown, and black.

A white giraffe, 3 feet long, has yellow triangular patches on its body, and a red mane, while other giraffes show patches in red. A giraffe running is exceedingly natural. Several buck in red have white necks and breasts, and ostriches have white wing and tail feathers. Storks and other birds have white necks and bodies, but black wings. Some birds are quite white, others pink and white. A bird sitting on a branch exactly resembles a robin on a Christmas card. Baboons are shown walking, climbing, jumping from bough to bough, and drinking.

The trees portrayed include knobby thorns, baobabs, umbrella trees, palms, tree-ferns, euphorbias, kafir orange, aloes, wind-blown trees, and monkey ropes, as well as aerial and exposed roots. Plant-life is general and lovely. There are flowers, flowering shrubs, some bi-coloured, also different grasses. The plants are numerous, and Mr. Dowsett, the curator of the Matopo Park and Nursery, states that some of the trees and plants are African, but not Zambezian. One plant, in a *Beispielen* set of paintings, has each of its six fronds of a different form, and is artistically conceived and portrayed.

The human form, in every attitude, and showing all forms of action, is very general, and is mainly scenic. All the original portrayals of men and women show the nude, but in the men there is nothing objectionable presented. The elongation of the human figure and the too natural male do not appear except in the work of later painters, who have covered over some of the original designs with less artistic drawings. A

man fishing, another with a noose, a man carrying a small buck, one up a tree shooting, a group standing round a slain buck (two examples), a man walking hand-in-hand with a woman (very gracefully depicted), archers with very long bows, groups of men sitting and reclining round fires, several mothers nursing children, also children crawling near parents, maidens dancing, dances of men, dances of men and women, many processions of men, and four examples of human spoor, right and left foot, standing, walking, and running.

Some caves contain hundreds of painted objects, but in none is there any representation of any Bantu object. These only appear scrawled over the paintings with pointed ends of charred sticks, and are the work of relatively late Bantu. The shining, jet black *manlis* (Kafir-god), and the concentric ring pattern, both forms common in Mashonaland paintings, are also in evidence in several of the Ma-Dobo paintings.

One feature of my new discoveries is the number of representations of the Victoria falls (one 6 feet × 4 feet). Of these four were met with; these making, with similar representations in caves I discovered in Mashonaland, a total of seven, while two others have been lately reported to me, making nine examples. The finest specimen shows streams of white water falling over red cliffs, the sides of the Devil's cauldron, and a pillar of spray rising from the foot of the falls to 2 feet higher than the top, and blowing off to the west.

But the gem of these discoveries was three carved snakes, with giraffe heads (as in the paintings). These snakes are on a flat rock near a cave with paintings. One is 6 feet long and the others 3 feet, and each is slightly incised in the rock throughout its entire length and width. Further, a painted giraffe and some buck discovered had their outlines incontinuously incised, not in single strips, in the rock before being painted, as also the line of vertical strokes representing their manes. This association of Bushman sculptor and Bushman painter points, I believe, to the identity of both as one people and of one period, a belief I have always held, though all painters were not sculptors.

These recently discovered paintings are undoubtedly important, and in every way they exceed in artistic skill anything portrayed, whether in Dr. Theal's collection, or those of the late Mr. Slow, the Misses Bleek and Tonge, or the South African Museum. I made about 250 tracings which I coloured on the spot to the tone of the originals, and these, with numerous photographs, constitute a unique Bushman National Gallery.

These notes are but preliminary to a fuller report I shall make to the Rhodesian Scientific Association after I have completed a second systematic search in the Ma-Dobo.

Including the Ma-Dobo caves and also the caves in Mashonaland and Matebeleland, the number of important sets of paintings on my register number a little over 300, while those of the *Beispielen* order, so far discovered, nearly exceed that number. This is evidence that the name of

Wak Wak given by Massonde, Edrisi, and other Arabian and Persian writers of the tenth to the twelfth century, to the region of our gold-fields, was well justified, as was also the name *Abutwa* ("the land of the little men"), which these territories have been called by the Bantu since some traditional time prior to 1485, and which latter name still appears on the most recent and all the present maps of Southern Rhodesia.

ENVIRONMENT IN TURKEY AND JAPAN.*

THE two papers noted below are both by Prof. Ellsworth Huntington, of Yale University, a geographer hardly surpassed by any for the numerous new ideas entitled to serious attention to which he has given rise, or for the fascination with which they are set forth. Prof. Huntington, though, as is well shown by one of those papers, possessed of a mind as hospitable to the ideas of others as prolific of his own, is always himself, so that these two papers are in every respect typical of his work. They both show the same spirit of eager research, the same directness, the same ingenuity, but here and there something of the same tendency to be hurried along by the sweep of a broad generalization. The general drift of both is well illustrated by a remark made in that on Japanese character. Speaking of Buckle's theory, he says that in a nutshell, "it was that physical environment determines the character and achievements of all the races of the world, and that climate is the most important of all the elements of physical environment," and that to dismiss this theory "as a 'blanket theory' unworthy of further study is as unscientific as to accept it without proof" (pp. 271–2). Formally, no objection can be taken to Prof. Huntington's observation. Moreover, no geographer will call in question the great influence of physical environment on human achievement, or the high importance of climate among the elements of physical environment, yet it may well be doubted whether cautious geographers are not right, after due study, in rejecting Buckle's theory as a "blanket theory," and whether Prof. Huntington, in spite of his painstaking habit of mind, does not allow his leaning to this theory to carry him too far. For instance, in referring to the general slackness and backwardness of the tropical races as compared with those of the temperate zone, he states, following Ireland, that from the tropics no man, except Mohammed, has ever arisen who has the least claim to a place among the world's leaders, and adds that Gautama, the founder of Buddhism, "was born and reared among the Himalayas, almost exactly 30° north of the equator." Now, apart from the fact that the birthplace of Gautama is placed somewhat too far to the north, that birthplace, instead of being among the Himalayas, was among the rice-swamps of the Tarai, at the foot of the Himalayas, where the chief influence of those mountains is to allow of a moist and uniformly hot tropical climate pushing further north than anywhere else on the globe, and the career of Gautama belongs mainly to latitudes considerably further to the south. Moreover, those who are most absolute in their contention of the incompatibility of native civilization with a tropical climate have to account on the one hand for such remarkable monuments as those of Angkor Wat, in Cambodia, and Boro Bodor, in Java, and on the other

* "Physical Environment as a Factor in the present condition of Turkey;" "Geographical Environment and Japanese Character." (Reprinted from the *Journal of Race Development*, vol. 1, April, 1911, and vol. 2, January, 1912.)

hand, for the remarkable engineering works of the Cauvery and the Tambraparni for the irrigation of plains in the extreme south of India, both due to native civilization long before the period of contact with Europeans, the former attributed by some to a date about 1500 years back.

This point need not be pressed further, and the above cases are instanced merely as a plea for not pressing too hard a generalization as to the broad truth of which no one has any doubt. Much more doubtful, as it seems to us, is another generalization which Prof. Huntington accepts with enthusiasm from Prof. C. J. Kullmer, of Syracuse University, observing with regard to it that "the reasonable nature of the hypothesis is so obvious when once pointed out, that it scarcely seems credible that the world should have so long been blind to it" (p. 276). The hypothesis is that there is a causal connection, through the influence of storms as a mental stimulant, between the frequency of cyclonic storms and the level of civilization. Examination of a map indicating this frequency "shows at once that the area included within the line of the storms [storm-centres during the years to which the map refers] embraces all the leading countries of the world," and that "Japan, the one country of Asia which rises to the European level of achievement, is the only Asiatic country subject to frequent cyclonic storms" (p. 278). One hardly knows where to begin in putting the questions that rush into one's mind on being brought face to face with such an hypothesis, and there is a difficulty in putting searching questions to one who is so ready to reply as Prof. Huntington is with reference to changes in climate. But one may observe that in hesitating to accept this hypothesis one is not required to doubt whether the tests alleged (pp. 279–80) to have shown the connection between barometric changes and mental activity may be confirmed by further observation. No limit is to be placed in advance on investigation. Yet something more than the confirmation of this observation is required for the establishment of the hypothesis referred to. Prof. Huntington recognizes that with reference to this hypothesis China is a problem. Once, he says, the Chinese were awake—"two thousand years ago." But "that was when the Greeks were awake, and the Jews, and other people of the ancient empires. In those days, apparently, storms were more frequent than now in the countries which have gone to sleep." But was it two thousand years ago that Japan owed to China many of the chief influences that moulded its civilization before it came in contact with Europe and America? Was it two thousand years ago that Marco Polo gave to an astonished and somewhat incredulous Europe his account of the remarkable civilization of the China of his day? Was it two thousand years ago that the Jesuit missionaries, in the time of Kanghi, beheld in China with awe-struck perplexity a well-ordered, peaceful, industrious, prosperous empire with which European Christendom contrasted so unfavourably? Fifty years ago who would have spoken so emphatically of the mental alertness of the Japanese, and at the present moment are all of those who know both Chinese and Japanese well as convinced as Prof. Huntington of the superiority in this respect of the Japanese to the Chinese? An error of some kind, it may be mentioned, appears to have crept in on p. 278, for after the reference on that page to a probable greater frequency of storms in the past in the countries which have now gone to sleep, the author goes on to refer to the evidence he has adduced elsewhere of pronounced changes in climate, and then says that "the changes thus inferred are of exactly the kind which would increase the storminess of the parts of the world where civilization has decayed." If the meaning is that the changes thus inferred are of the kind to justify the belief in a former greater storminess of those parts of the world, greater clearness of expression is required, and want of clearness is a very rare fault with Prof. Huntington.

GEO. G. CHISHOLM.

REVIEWS.

EUROPE.

'The Sussex Coast.' By I. C. Hannah. (London: Fisher Unwin. 1912. Pp. 409. *Maps and Illustrations.* 6*s.*) This volume has been added to the series now appearing under the title of "The County Coast" series. It is an interesting volume of its kind, chiefly concerned with matters of local history, but also taking account of the formation of the coast and the country adjacent to it, and in particular of those physical changes in the shore-line which have taken place within historical times, and have affected certain places on the Sussex coast almost more markedly than any elsewhere. The book is illustrated both with photographs and with some excellent drawings by Edith Brand Hannah.

'How to see Italy by Rail.' By Douglas Sladen. (London: Kegan Paul, 1912. *Illustrations.* 7*s.* 6*d. net.*) An attractive and useful aid to tourists. The letterpress is more in the nature of a poetical description of the localities worthy of visit than a bald enumeration of the buildings, galleries, and other attractions of the thousand and one centres of interest scattered in such profusion from Turin to Girgenti. The drawback of Baedeker and Murray is that in the space devoted to each town or resort there is little or no perspective, so that a rapid perusal of the subject-matter conveys little to dwell in the memory. Mr. Sladen does his best to help the reader in his selection of sights most worthy of study, while the great number of photographs which are so liberally provided is a very welcome aid to those who wish to preserve a lasting reminiscence of the fascinating and countless charms of the garden of the south.

ASIA.

The Karakoram.

'S.A.R. Il Principe Luigi Amedeo di Savoja Duca degli Abruzzi. La Spedizione nel Karakoram e nell' Imalaja Occidentale 1909. Relazione del Dott. Filippo de Filippi, illustrata da Vittorio Sella.' Bologna: N. Zanichelli. 1912.

The full results of the Duke of the Abruzzi's carefully organized expedition to the Karakoram are here given to the world in a sumptuous setting. Dr. F. de Filippi furnishes the text, and Signor Vittorio Sella, to whom all mountain-lovers are so deeply indebted, once more provides a series of illustrations and a case of panoramas, with the aid of which the reader can follow every step of the narrative and realize the characteristic and stupendous features of the peaks and glaciers of the Karakoram. The readers of this *Journal* have already had the main facts and incidents of the Duke's journey set out in a condensed form. It is needless, therefore, to follow his campaign in detail. Its chief geographical results were a thorough exploration of the eastern and western flanks of K^2, an improved map of the Baltoro and Godwin-Austen glaciers, a number of meteorological and climatical observations, and geological and botanical notes. In the production of the map a method involving the use of photography was adopted similar to that described by Mr. Wheeler in these pages in June, 1911. The careful explanation given by Lieut. Cambiaso will be found worth study; and, as he points out, the reference to such methods in our 'Hints to Travellers' calls for some revision. The altitudes were determined barometrically—and in this connection it is to be noted that the similarly ascertained heights of the seven highest peaks of the Ruwenzori group differed in only two instances from the trigonometrical results of the Boundary Commission by more than one hundred

feet. From the mountaineer's point of view the journey was made memorable by the attainment by the Duke and his Alpine guides of a height of 24,402 feet on the Bride peak, the highest altitude yet reached by man on a mountain. The climbers were stopped by bad weather and not by exhaustion, and the experiences of the party with regard to the physiological effects of climbing at high altitudes are of the highest interest in their bearing on the future of mountaineering.

The volume before us gives a consecutive narrative of the journey of the party from the time they landed in India. But Signor de Filippi passes lightly over the preliminary part. He writes th ughout with a sense of proportion rare among travellers, and to this he adds a thorough acquaintance with the previous literature of his subject, and a picturesque touch which never interferes with precision and accuracy where these are called for, or falls into the snare of fine writing. The Duke is to be congratulated on his chroniclers. The record of his campaign could not have been better written or better illustrated. It is to be hoped that it will be issued before long in an English edition.

Himalayan explorers will find several subjects of the greatest practical importance discussed in these pages. Amongst these diet and equipment are primary. Signor Sella seems to have devised a form of footgear which defies frostbite and yet is not an incumbrance in climbing. A further consideration is the treatment and training of native porters. Here Dr. de Filippi endorses the judgment of Major Bruce, lately confirmed from a very different district by Dr. Kellas. And he adds with justice that it is not only coolies, but European climbers, who have to be trained, to learn to adjust their previous experiences, to a range of incomparably greater proportions and to snow and ice conditions very different from those of European mountains. The observation that many of the natives whose homes are at high altitudes suffer from valley sickness on descending to lower ground is consistent with Dr. Kellas's experience that his coolies, habituated to life at 8 to 10,000 feet, moved more rapidly over 2000 feet than he could.

The illustrations are as much to be praised for their beauty as for their topographical value. 'An evening on the Baltoro at Camp II,' p. 374; 'Sunset from the rocks above Rdokass,' p. 248; 'K^2 from Concordia,' p. 356, are pictures which suggest the most subtle effects of the upper world. To these must be added the frontispiece taken by the Duke of the Abruzzi at a height of 21,656 feet 'K^2 from the southern crest of Staircase peak.' On the whole, the distinguishing features of the Baltoro would seem to be in its lower portion, the fantastic sublimity of the rock peaks, and the sternness of their lower slopes, in the upper region the vast expanses of the glaciers and snow-fields, and the prodigious scale of the whole range. D. W. F.

AFRICA.

The Kasai Basin.

'Land and Peoples of the Kasai.' By M. W. Hilton-Simpson. Illustrations and Map. London: Constable & Co. 1911. 16*s. net.*

The remarkably valuable ethnographical work accomplished by Mr. Emil Torday in the Kasai basin, Belgian Congo, during 1907-9, is now well known to those interested in primitive culture. Mr. Torday, in collaboration with Mr. T. Athol Joyce, is publishing the scientific results of his mission: it has been Mr. Hilton-Simpson's task to prepare a narrative of the expedition, which he accompanied throughout, suitable for the general public. This task he has ably accomplished. In a plain straightforward manner he tells the tale of the

journeyings of the expedition among the peoples of the Kasai basin. The description of the country—the great rivers, the vast, monotonous but grandly impressive forests—is good and presents a clear picture, and we have to thank Mr. Torday for the exploration of a district between the Kwilu and the Kasai hitherto unmapped. But the chief interest of the book lies, naturally, in the accounts given of the various tribes visited and carefully studied.

These Bantu peoples of the Kasai present many attractive features. Regarding rather their character, physical, moral, and intellectual, than ethnological details and particular customs, the reader (rightly, we believe) will conclude that such tribes as the Batetele and the Bushongo (who, coming originally from the Shari, have a mixture of non-Negro blood) are capable of developing upon natural lines a considerable degree of civilisation, and will be able, if properly guided by wise white advisers, to stand successfully the shock of contact with European culture. Such rulers as Kwete, the Nyimi (great-king) of the Bushongo, of whom Mr. Hilton-Simpson gives a sympathetic pen picture, bear no resemblance to the traditional conception of the savage negro chieftain. This traditional type may be recognised however in the Bankutu cannibals, whose home is in the dense forest, where the Belgians are unable to exercise any authority. The Bankutu and the dwarf Batwa are at the lower end of the scale, while in art and handicraft the Bushongo take a noteworthy place. The Batetele, keen, enterprising and imitative, have already acquired some measure of European culture. These with the Bakongo and the Bashilele form the chief tribes described by Mr. Hilton-Simpson. The journey was noteworthy for the excellent relations the travellers maintained with the natives throughout. Some of the credit of this is due to the author of this book, which is of real interest both as a travel story and as an introduction to the serious study of the ethnology of the districts described. The volume has many illustrations, including eight coloured plates, the majority by Mr. Norman Hardy, who was with the expedition part of the time.

F. R. C.

AMERICA.

The American Fauna.

'The Origin and Relationships of the American Fauna. Distribution and Origin of Life in America.' By R. F. Scharff. London: Constable & Co. 1912. Pp. xvi., 497. *Price* 10*s.* 6*d. net.*

In this volume, which is based on a course of Swiney lectures delivered in 1908 in the Royal Victoria and Albert Museum, the author has brought together a large amount of information in regard to the history of the American fauna and its relationship to those of other countries. He has likewise quoted and contrasted many theories relating to supposed former land-connections between America and other countries, especially the Antarctic, and likewise in respect to periods of union and severance between North and South America. He also appends a full bibliography relating to the subject, which cannot fail to be of use to other workers; and in this portion of his task, which must have involved heavy labour, Dr. Scharff is entitled to the thanks of all interested in the study of geographical distribution.

When, however, we come to the author's views with regard to the origin and relations of the American fauna, or rather of the faunas of the two halves of America, we cannot be so unstinting in our commendation. Taking, for instance, the case of the typical American deer, such as the white-tail of the north and the guemels and brockets of the south, the general opinion, as endorsed by Prof. H. F. Osborn, is that these deer, like the rest of their tribe,

are derived from an Old World stock which entered North America by way of Bering strait, and eventually, after the union of the two continents, made their way into South America, gradually degenerating in bodily size and antler-complexity as they travelled south. This view is supported by the fact that deer are totally unknown among the Miocene Santa Cruz fauna of Patagonia.

Dr. Scharff, however, after referring (p. 111) to what he believes to be a close relationship between the South American representatives of these deer and the roebucks of Europe and Northern Asia, observes that, in his opinion, "all the deer of South America have originated from one or more ancestors which invaded that continent direct from Europe in early Tertiary times. Although it is true we possess little palæontological evidence in support of such a theory, a land-connection must then have joined Europe with South America." If there was such a bridge, we may ask, Why did not other European animals take advantage of it, and make their appearance in the Santa Cruz Miocene, where, like deer, they are conspicuous by their absence? Why, too, did not South American mammals travel by the same route to Europe? It is true that the author (p. 373) elsewhere expresses his opinion that the ancestors of the African ant-bear and of the pangolins of tropical Asia and Africa reached the Mediterranean area by a land-bridge from South America, but this, he says, was at an earlier date. And we should much like to know something definite with regard to these problematical South American ancestors of two exclusively Old World groups!

The case of the typical American deer is not, however, the only instance in which the author assumes the existence of toll-bars impassable to certain species; for he tells us that while some reindeer reached America by Bering strait, others arrived by an Atlantic bridge connecting Scandinavia and Greenland. If reindeer were allowed to pass, why were the gates closed to roebuck, red deer, bison, and the wild ox?

Camels, we are told, reached Asia from America by a Pacific land-bridge and mastodons are stated on page 408 to have arrived in the New World by the same highway. The later statement, if we grasp the author's meaning, which is by no means easy, appears to be contradicted by the theories promulgated on pp. 230–231.

Many other instances of theories based on the most slender evidence, or on practically no evidence at all, might be cited, but the foregoing are sufficient to show the untrustworthy basis of Dr. Scharff's conclusions.

R. L.

Mexico.

'Les États Unis du Mexique.' Par le Comte Maurice de Périgny. Paris: E. Guilmoto. 1911. 5 *fr.* 50.

This is a pleasant general account of Mexico by an intelligent observer who has traversed it in different directions, chiefly by rail, and who has acquired the main facts of its history and the usual statistics. He has, fortunately, a lighter touch than some previous writers, and carries the reader gaily through his mine of information without fatigue and with a sense of confidence in his judgment. A good summary of the history is followed by a chapter on the laws and constitution, with the changes proposed to be introduced by the present Government. The information on finance, commerce, and mines is useful, although the rapid mention of the mines makes it difficult to understand where they are, if unacquainted with them. The Dos Estrellas mine, near El Oro, on the border of the States of Mexico and Michoacan, chiefly in French

hands, "distributed in 1908 its twentieth million (francs) of dividend," having previously repaid the capital.

Brief descriptions of the States and their cities are enlivened here and there by vivid touches which bring before the mind's eye such scenes as the brightly coloured groups of humble folk at wayside stations, the green and flowery gardens of public squares, or the tropic forests of the Usumacinta river. The transition from one state to another is scarcely sufficiently marked when the name merely occurs in the middle of a sentence, and the spelling of several place-names needs revision. The great ruins which were the principal object of these journeys are slightly touched on, except Mitla, which is more fully treated, and Rio Beque, discovered by the author in Southern Yucatan. Little is said of the scenery or geology apart from the beaten track, and *des effroyables barrancas* is the only remark on the ride between Colima and Tuxpan round the slopes of the great volcano, where the barrancas provide interesting sections. In Yucatan the author bears witness to the general good treatment of peons in the haciendas. The conditions there are unlike those of the plateau, where the contrast between the wretched herd of the haciendas and the Nahuatl-speaking Indians who have their own villages and lands, is very marked. The latter are some of the most prosperous and self-respecting communities in the world.

M. de Périgny is one of the few foreigners who have recently been round the south-east coast of Yucatan to Belize, and he visited Chansantacruz, the famous stronghold of the rebel Mayas (now in military occupation), Bacalar, which was wrecked by the war, and Ycaiché, the last-named still inhabited by peaceful Mayas, who are "scrupulously honest and faithful to their word, and have only one vice, or rather desire, to gratify, that of drunkenness, the result of which is an excessive good humour."

A. C. B.

TRIBES OF CENTRAL BRAZIL.

'In den Wildnissen Brasiliens.' By Dr. Fritz Krause. Leipzig: R. Voigtländer. 1911. 12*m.* (*bound*, 14*m.*).

Dr. Krause was sent out by the Leipzig Museum für Völkerkunde in 1908, to study certain tribes between the provinces of Goyaz and Matto Grosso in central Brazil, and to collect specimens of their handiwork. German explorers and investigators have contributed a great deal of what is known of the tribes of these vast regions in the interior of South America, where the stratification of peoples of different linguistic stocks is extremely complex. The valuable results of the Xingu Expedition are well known, and the problems of the adjacent river-system, that of the Araguaya-Tocantins, are equally intricate. Dr. Krause has continued the work begun by Dr. Ehrenreich on his journey in 1888; his object being to study such questions as the position of the isolated Karaja language and the relations of the men's and women's language, the significance of the mask-dances, the origin of the weaving processes, and to gain ethnographical information about the Tapirapé and Kayapo, whom Ehrenreich was unable to visit.

Parts of this ambitious programme have been most ably fulfilled, and we have nothing but praise for the author's careful descriptions of the material culture of the Karaja and their neighbours, which he has illustrated by many excellent photographs and drawings. The divergence between the languages of Karaja men and women resolves itself into the insertion of *k* between two successive vowels by the women. In the author's opinion the women's dialect probably represents an older form of the language, and there is no question of its being of diverse origin from the men's. It is greatly to be regretted that Dr.

Krause was able to study their sociology and religion to so very limited an extent only. To spend only a day and a half among the northern Kayapo, a people of the as yet unstudied Ges linguistic family, seems a grievous waste of a magnificent opportunity for research. In fact Dr. Krause's work, like that of Dr. Koch-Grünberg in North-West Brazil and of other German ethnologists, concentrates on technology to the exclusion of those data which are really needed in order to gain a general impression of the stage of culture of the people dealt with. Dr. Krause is a very careful observer, and information from him on other sides of culture would have been extremely welcome. He is cautious in the matter of general conclusions, realizing that much comparative work must be done in this region before any pronouncement can be made as to the racial affinities of the Karaja.

The book is well arranged. Part I. gives a detailed account of the journey, the course of which is shown on a map, and contains some interesting descriptions and illustrations of the country traversed. We may mention in particular the description of the grass- and bush-clad plateaus (*chapadão*), intersected by deep water-worn valleys, which stretch towards the watershed dividing the Paraná and the Tocantins, and that of the upper course of the Araguaya and the land through which it winds (pp. 43–47). Part II. gives the scientific results obtained, which are classified under certain headings which render the book convenient for reference. Vocabularies and a few brief Karaja texts are given in appendices. There are sixty-nine plates, over five hundred text-figures, and two maps. A. C. Haddon.

'The Wilderness of the Upper Yukon.' By C. Sheldon. (London: Fisher Unwin. 1911. Pp. xxi., 354. *Maps and Illustrations.* 12*s.* 6*d.*) This author travelled in pursuit of big game—wild sheep principally, but caribou, moose, bear, and others besides. He is interesting on the little-known lands which he penetrated, on those settlers whom he met doing the same, and on the small fauna of the region. The illustrations are striking and the maps good. One map shows the distribution of sheep according to colour in the area covered. A bibliography of sport, natural history, and exploration in Yukon territory is provided.

'The Western Gate.' By P. H. W. Ross. (New York: Dodd, Mead. 1911. Pp. v., 150. *Maps.* 75*c.*) This volume is conceived in a somewhat curious style by a writer who hopes to see something in the nature of a federal district established in the western part of Washington, to form a focal point of the Pacific trade of the United States. He insists upon the natural advantages of Puget sound. He distinguishes between what he terms the Baltic and the Mediterranean types of climate and human character, and applies the distinction between them to Washington and San Francisco. He also compares the climate of Washington with that of England, and the position of the one with regard to the Pacific with the position of the other with regard to the Atlantic. It is difficult to follow him in the statement that no port of supreme consideration can ever be established at the mouth of any great river.

'Ranching, Sport, and Travel.' By T. Carson. (London: Fisher Unwin. 1911. Pp. 819. *Illustrations.* 10*s.* 6*d.*) The greater part of this book deals with the adventures of a rancher in south-western States of North America, whose experience is long, and who has therefore participated in stirring events which belong to a stage of development now past. The writer has also a chapter on tea-planting in India, and some general notes on travels which have touched every continent.

'Adventures in Search of a Living in Spanish America.' By "Vaquero." (London: Bale, Sons & Danielsson. 1911. Pp. viii., 304. *Maps and Illustrations.* 8*s.* 6*d. net.*) This is a curious book; it is long, and sometimes tedious by reason of the repetition of similar details and incidents, but the writer (a doctor) travelled under conditions so unusual and came into such close relations with the people of the countries he visited, that his narrative cannot be read without interest. He ranged from New Orleans and Mexico to the island of Chiloe and back again.

'Along the Andes and down the Amazon.' By H. J. Mozans. (New York: Appleton. 1911. Pp. xx., 542. *Maps and Illustrations.* 12*s.* 6*d. net.*) Dr. Mozans adds a second volume of South American studies to his 'Up the Orinoco and down the Magdalena.' The journeys here dealt with include the passage from Panama along the coast to Mollendo, the ascent to the Titicaca plateau and a visit to Cuzco, and lastly the crossing of the Andes from Trujillo to the headwaters of the Amazon and the course of that river to its mouth. The book may safely be set down as much above the average of travel-narratives, for the author has closely studied the literature of South America, and not only quotes freely but often adds to what he quotes. His chief interest clearly lies with the remains of antiquity in Cuzco and elsewhere. He had exceptional facilities for studying some of them, and brings a touch of authority to bear upon them. His incidental notes on the physical geography and natural history of the Amazon are instructive.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Climatology.

'Die Klimate der Erde.' Von A. Hettner. Sonderabdruck aus dem XVII. Jahrgang der *Geogr. Zeitschrift*, heft viii. bis xii. Leipzig: Teubner. 1911.

In these papers we are given a classification of the climates of the globe. The climatic divisions arrived at are not very different from those of Köppen and others, but the principle on which they are based is different; the real cause of climatic differences is to be found in the general circulation of the atmosphere, and Hettner insists that any scientific classification must be based on this, without regard for mathematical climate, which he considers to have too much weight still with geographers. Thus the classification is essentially causal, and Hettner points with satisfaction to its close agreement with Köppen's, which is based on vegetation, the surest expression of climate.

We are glad to note his insistence on a real geographical conception of climate, as the result of the manifold interactions of the various factors, not merely the algebraical sum of temperature, humidity, etc. Analysis is of course essential, but this is rather the sphere of the physicist. The geographer has to go further, and synthesize the separate elements again in the light not only of their individual qualities, but of their combined effect.

Hettner's papers are notable as a model exposition of the fundamental principles and main facts of the climates of the globe. Starting as usual with the ideal atmospheric circulation on a water-sphere, we see how it is modified by the presence of a land-mass assumed to taper from a wide expanse in the northern hemisphere to an apex in the southern, and so approaching actual conditions. The winds, moisture, dust, light (more fully treated than usual), temperature in different regions are considered separately as controlled by the general atmospheric circulation, and lastly the synthesis is attempted, and a classification of climates obtained. It is perhaps unfortunate that Hettner has not elaborated this final chapter, the goal of his work, and given a map or

detailed regional description; we are referred for this to the regional treatment of temperature, rainfall, etc., given in earlier chapters, a treatment which is indeed much more geographical than that often found, but which, after all, is analytical and can hardly do duty for the synthesis on which Hettner himself justly lays stress.

His claim for a more adequate treatment of that most important factor, moisture, is timely; we have been too long content with a barren statement of amount of precipitation, often only the yearly total, without any attempt at a description of the kind of rain, its diurnal and seasonal period, number of rainy days, etc. The downpour of a tropical thunderstorm, the slower but more persistent contribution of a North Atlantic cyclone, the drizzle of a Scotch mist,—all is "rain," so many inches in the year, the time of day, season of year, and the qualities and causes of the phenomenon all ignored, as also the amount of evaporation, a factor of almost equal importance with rainfall. Hettner is certain of sympathy in his plea for a more scientific as well as a more artistic—in a word, a more geographical—treatment of this element of climate.

W. G. K.

WEATHER.

'Forecasting Weather.' By W. N. Shaw, F.R.S., SC.D. London: Constable & Co. 1911. *Maps, Charts, and Diagrams.*

In this volume Dr. Shaw sets forth the results of his eleven years' experience as Director of the Meteorological Office, and there is enough in it to show that, although forecasting is still in its empirical stage, great strides have been made in the prescience of the weather since the time when daily weather conditions first came to be carefully watched and studied by means of synoptic charts. The system of forecasting in vogue to-day is based mainly upon the principles established by the late Hon. Ralph Abercromby in his 'Principles of Weather Forecasting by means of Synoptic Charts,' but the rules of forecasting have naturally, in the light of years of continuous experience, now become far more finely elaborated. In one important feature Dr. Shaw's book is unique of its kind: it is a masterly exposition of the physical processes concerned in the very phenomena of weather changes which it is the great problem of meteorology to solve. Any one indeed sufficiently acquainted with the fundamental laws of thermodynamics to view the Earth's atmosphere as a great physical laboratory, must needs peruse this work with enjoyment and advantage, and with a full sense of the grandeur of the science of meteorology.

Emphasis is laid on the newly discovered relationship between wind and pressure gradient, and the interpretation of this relationship. When the method of synoptic charts first revealed the existence of the closed isobaric systems of low and high pressure, known as cyclones and anticyclones, the wind was theoretically supposed to flow radially out of the high pressure system, and into the low, the air currents being thus in a certain sense secondary to, and dependent upon, these systems. But Dr. Shaw clearly explains (what is so far in accordance with old ideas) that it is the currents which are the important things, and that the cyclonic and anticyclonic centres connected with the general circulation of the atmosphere may be regarded quite as truly as being maintained by the wind as maintaining the latter. The anti-cyclone, in fact, is often merely an inert mass of air taking little part in the neighbouring circulation, but steering long-distance air currents round its flanks. In the cyclonic system the forces producing its pressure-gradient are balanced by an appropriate velocity of the wind.

We are not sure that the paradoxical phrase "cooling by warming," which

the author uses on p. 149 in connection with the process by which air heated at the surface becomes cooled by expansion when it rises to higher levels of the atmosphere, is altogether good, as it may tend to confuse the ordinary reader by concealing the fact of the expansion.

A full and candid statement is given of the efficiency and utility of weather-forecasts both general and special, such as storm warnings to the coasts, and special forecasts for agriculturists and for aeronauts.

Perhaps the most disappointing chapter in the book from the point of view of practical meteorology is that on colliery warnings. It is clear from this that a very close and elaborate investigation remains to be made as to the precise atmospheric conditions favourable to colliery explosions. In the ordinary course of events life is grim enough in the great colliery districts of England, and it is surely high time that science were able to do more to avert the doom that from time to time hangs unsuspected over a mining village. Facilities are needed to conduct an important piece of research, and these granted, the skill to do so would not be found lacking.

The foremost justification for the pursuit of any branch of physical science is the service to which it may lead in the improvement of the conditions of human life upon the globe and the incidental contribution to national honour, greatness and prosperity; and we believe that the present time heralds the brighter dawn of that epoch when meteorology, firstly through the obvious channel of successful weather forecasting for longer periods than is now possible, and secondly through the manifold potential applications of meteorological knowledge to the sciences of engineering and medicine, will be able to afford one of the greatest careers which this or any other country can offer a young man. L. C. W. B.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

The Erythræan Periplus.

'The Periplus of the Erythræan Sea.' Translated and annotated by W. H. Schoff. *Illustrated.* New York: Longmans. 1912. *7s. 6d. net.*

Readers of this *Journal* will remember that their attention was called last May, by Mr. J. W. Crowfoot, to some problems in the ancient topography of the Red sea coast. That writer was concerned in the main with Ptolemy, but he had also to take account of the anonymous Greek "Red Sea Pilot," whose text has been preserved for us by two manuscripts; one in Heidelberg, and the other in London. Both the text and a translation into our own tongue have been published in well-known English books, those of Dean Vincent and of Mr. McCrindle, and a critical edition with German translation, issued in 1883, by B. Fabricius, still supplies all the needs of scholars. But there is, undoubtedly, a large public, ready from curiosity or commercial interest, to read the Periplus in English and study a commentary upon it, could it easily obtain access to it, which has never heard of, or cannot lay its hands on, the publications just mentioned; and it is with a view to this public that the secretary of the Commercial Museum in Philadelphia, Pa., has translated the Greek text afresh, and issued it with full notes on subject-matter in pursuance of the museum's plan of "making a graphic history of commerce from the earliest dawn of trade and barter down to the present time." This being the end in view, the book is certainly well justified of its appearance, and its very good and full index will make it useful even to the scholars and specialists, for which avowedly it is not intended. It badly wants a map, however. We would gladly have given for this all its

photographic illustrations, several of which are not particularly illustrative. On the whole, it strikes us as very well done. Collation of manuscripts and autopsy of the ground described are not called for in the preparation of a book published with an eye to a commercial and comparatively uninstructed public; but careful and discriminate reading of modern books on the regions touched by the author of the Periplus is called for, and this has evidently been conscientiously done. The book was probably in type before Mr. Crowfoot's article came to its author's knowledge, and in a future edition he will doubtless take account of the strong reasons there adduced for finding the site of Ptolemais not on the island of Er-Rih or Airi, where the remains are all mediæval, but at the mainland settlement of Akik. He might also, in treating of Berenice, say something of the "Tariff of Coptos," a very remarkable inscription found at Kuft by Petrie in 1894, which throws considerable light on Red sea traffic.

The book is open to criticism on some accounts; but it is both insidious and difficult to criticize it just because it must have been so difficult to compose it for the particular public which the Museum desires to instruct; and if we say that the notes seem to us too long, too full of matter which is often rather remotely connected with the text, and too miscellaneous, we do so doubtfully, and with no intention of laying any stress on our opinion or detracting from the judgment already expressed that the book is a good and useful one. Nor again, if we point out that the reader is not sufficiently warned of disputable points in translation and commentary, are we sure that the needs of that particular public would have been better met by the presentation of alternative renderings or discrepant views. Just to show what we mean, we will cite first section 16 of the translated text, where Mr. Schoff gives a rendering which cannot be got out of the Greek as it stands in either of the manuscripts or has been printed by any modern critical editor. Even for his public we suggest that it would have been more satisfactory if he had stated how that rendering can be justified (it must be by radical emendation of the manuscript text), and why and wherein "previous translators . . . much misunderstood the meaning of the passage." If the manuscripts are respected, Fabricius rather than Mr. Schoff is right. Again, the statement that Ælius Gallus turned back from the valley of the Minæans without reaching his original objective, Marib, is to assume certainly for a very doubtful view, not put forward even by its main supporter, Glaser, as conclusively proved. Against the explicit identification of Gallus' Mariaba with Marib, which Pliny puts forward, and the correspondence of other data, Glaser only adduced the discrepancy of the present condition of Marib in respect of water with Strabo's statement that lack of water caused Gallus to raise the siege after six days. Since an exceptional season or some action of the Sabæans might easily have caused this scarcity, it is much too strong to say that Glaser "proved" that Gallus never got to Marib.

These are very minor blemishes, however, if blemishes at all. In the main, both translation and commentary are careful and adequate, and Mr. Schoff is to be credited with reasonable views on most points in dispute, *e.g.* on the authorship and date of this curious treatise. He is fully justified in relegating to "curiosities of criticism" the views of those who postdate the 'Periplus' to a time when there were two Augusti jointly reigning, on the ground of section 23. The phrase there used by the Greek author much more obviously refers to successive Augusti, if it is indeed any more than an expansion of the title "philosebastos," probably assumed by the Arab princeling in question, as by many another client of the empire. For ourselves, however, we fancy the date is perhaps a little later than Mr. Schoff puts it. The reference to the famous

pioneer voyage of Hippalus seems to imply that this was fairly ancient history when the 'Periplus' was written, and there is no conclusive argument against the end of the first century, or even the beginning of the second.

D. G. H.

GENERAL.

Early Travels.

'Korte Historiael van verscheyden voyagiens gedaen door David Pietersz. de Vries, uitgegeven door Dr. H. T. Colenbrander.' The Hague: M. Nijhoff. 1911. Pp. xliv., 302. 10 *gulden* (16*s.* 8*d.*).

This, the third volume of the publications of the Linschoten Vereeniging—the worthy rival, though young in years, of our own Hakluyt Society—should be particularly welcome in this country. Of the work reproduced, only one copy is now known to exist in Europe, all others that have occasionally come to hand having been eagerly purchased for America. The voyages performed and narrated by the author, a merchant adventurer, between 1618 and 1644—more especially those made to New Netherland and Guiana—were frequently utilized by nineteenth-century Dutch and American historians, but never, strange to say, found their way into the great English collections of travel, whilst a translation of those parts dealing with America, made in 1853 by H. C. Murphy, United States Ambassador to the Netherlands, was issued in an edition of 250 copies only.

The editing of the present issue—evidently limited by the Society's rules—is well done so far as it is allowed to go, but there might well have been more and longer notes, and a fuller introduction; we say this the more sincerely, well knowing how capable the editor would have been of enhancing the value of the work by drawing more largely upon his own store of knowledge.

Of all the descriptions given by de Vries—and always with that fulness of detail characteristic of the early navigators—those of the early Dutch and English settlements, growing up side by side on the North American coast, are by far those which interest us most, and the author is fair enough to declare outright what far better material for colonists there was in the English Puritans than in the deep-drinking Dutch—more than once is the striking contrast drawn.

Besides much of general interest in these pages there is, moreover, one passage of particular value, one which bears directly upon the vexed question of the foundation of the Dutch settlement of Essequibo, the parent colony of British Guiana. According to a statement (in part correct and therefore doubly dangerous where it errs) first committed to writing by Major John Scott, commander of an English force that held Essequibo for a few months in 1665, a fort was erected there in 1616 by one Groenewegen, who is said to have governed the colony for forty-eight years, and who died in 1664. In the Dutch records of Essequibo, extant from 1623 onwards, the first mention of Groenewegen occurs in 1644, but Jan van der Goes is repeatedly spoken of, first as postholder, afterwards as commander, from 1627 to 1640, the former of these two dates being also given as that of the erection of the fort. The lines from de Vries corroborate the Dutch records and discredit Scott completely; incidentally, they are interesting from a humanitarian point of view.

"On the 30th [of October, 1634] we weighed anchor" [de Vries was then lying in the Saramacca, near the Surinam river] "and were boarded by some hundred and fifty savages, men and women, who begged us to take them to Demerara. They were a tribe calling themselves Sapayes, and were afraid the Caribs were going to kill them. . . .

"On the 2nd [of November] . . . We arrived at noon in the River Demerara . . . and disembarked the savages, who immediately cut timber to make dwellings, since they were nearer their friends here. *Whilst we were lying here there arrived in a canoe from River Essequibo Jan van der Goes, who is commander there on behalf of the West India Company.*"

It is only fair to add that the contention of Scott's defenders is that Groenewegen arrived in Essequibo on behalf of private traders in 1616, and that he entered the Company's service only in 1644. It is, however, extremely improbable that the Company's records would from 1625 to 1644 have omitted all mention of a man (had he been there) who is, by Scott, said to have been governor of the colony since 1616.

J. A. J. de V.

THE MONTHLY RECORD.

EUROPE.

The Story of the Forth.—There is a certain fascination in attempting to trace through bygone ages the evolution of the present hydrographical system of any region, but it may be granted that in every case clearness of vision varies inversely with the distance to which one attempts to penetrate into "the dark backward and abysm of time." Further, the credibility of the conclusions which may be reached depends entirely upon the truth and completeness of the premises upon which they are based. In a paper with the above title, printed in the May number of the *Scottish Geographical Magazine*, Mr. Cadell gives us what is in part a very suggestive essay in speculative hydrography, and there would be no reason to traverse his conclusions, if one could feel certain that he had taken into account all the possible conditions which may have affected the development of the present river-system of Central Scotland. Mr. Cadell assumes that the elevation of this region in Miocene times resulted in the formation of a great inclined plane, down whose surface flowed consequent rivers in a west-to-east direction. He takes no account, however, of the equally possible tilting of the surface in a north-west to south-east direction, as suggested by other authors; nor of the probability of a considerable amount of crustal warping having accompanied the general movement of elevation. Further, he gives little consideration to the effect of the formation of the Kilbirnie gap upon the earlier drainage of the Clyde basin. The Kelvinhead gap was undoubtedly at one time occupied by a river, but there is no reason to believe that it formed the only line of drainage for the western waters from the period of Miocene elevation to the date of the opening of the present outlet. The interpretation of the mutual relations of the Kelvinhead and Kilbirnie gaps is full of difficulty, and the matter is further complicated by the possibility of the occurrence of movements of relative elevation and depression along the present watersheds through the accentuation of earlier folds during the later oscillations of the crust. Mr. Cadell gives a most valuable detailed account of the formation of the present estuary of the Clyde, and every one will agree that phenomena of capture such as he describes have played a most important part in the establishment of the present hydrographical *régime*. With regard to the tributaries of the Forth, it is very doubtful whether the Avon, Almond, Water of Leith and North Esk should be regarded as true consequent streams. It is equally possible to assume that, like the Devon,

they are of much later origin. In his discussion of the buried channels of the Forth valley, however, Mr. Cadell is on surer ground, and one follows with sustained interest his explanation of the origin of many puzzling features of the scenery of the Forth and its tributaries. His suggestion that certain portions of the buried channels may have been excavated during glacial and inter-glacial periods is certainly worthy of consideration, although it introduces still another element of complication into the story of the Forth. The paper concludes with a number of interesting practical notes on the difficulties of bridging and tunnelling our British estuaries.

Submerged Forests, and Drumlins, in Donegal.—As a result of recent field-work in County Donegal, Mr. W. B. Wright has contributed papers on the above subjects to the March and April numbers of the *Geological Magazine* for 1912. Submerged forests in some of the Swedish lakes have been thought by geologists of that country to indicate that the levels of those lakes must formerly have been lower, and that—the possibility of change of level owing to obstruction of outlet by peat or a tilting of the surface being ruled out in the cases in question—the only explanation must be that the climate has become more humid since the forests existed. Mr. Wright has examined a number of small lakes in Donegal, and has found submerged stools of trees in a fair number, though he was not always able to say with certainty that they were still in the position of growth, or that an obstruction of outlet had not taken place. In two of the lakes, however—Loughs Bannus and Avehy—there seems no doubt on these points, while the remaining explanation that either a general or local warping or tilting of the surface has taken place has no other evidence in its favour. These lakes would therefore seem to afford evidence of a change of climate (which, if it has taken place in Sweden, would very probably extend to Ireland also), unless, as Mr. Wright puts forward as a further possibility, the existence of extensive forests may itself have diminished the supply of water in the lakes. That forests, without increasing rainfall, at least help to conserve water-supply, is hardly open to question, so this supposition seems extremely doubtful. In the paper on Drumlins, Mr. Wright carefully describes the various forms of this somewhat puzzling legacy of the Ice Age observed by him, and comes to certain conclusions as to the methods of formation of the various forms, though admitting that the question may never be quite satisfactorily solved. He thinks that they are built up by the addition of material chiefly along the median line, and that the crested or rounded outline depends on the maintenance or otherwise of the addition of material until the cessation of the ice-motion. The horizontal plan of the drumlins seems to depend on the constancy in direction of the ice-motion, or on the sudden or irregular changes of such direction.

Proposed Pyrenees Road.—The recent opening, under the auspices of the French Touring Club, of an "Alpine road," affording uninterrupted communication from the mountains of Dauphiné to the Côte d'Azur, has suggested the execution of a similar scheme in the case of the Pyrenees, and a study of the subject has been made by M. Barrère, whose report is summarized in the supplement to the *Tour du Monde* for March 30 of this year. It is pointed out that existing roads passable by carriages permit of travel from one end to the other of the chain, in a direction parallel to its axis, with only five comparatively short breaks, of an aggregate length of 119 kilometres; the total of the existing roads being 734. One of the longest sections to be constructed would be in the western portion, between Esterençuby and Larrau. This would traverse the fine forest of Iraty, and cross the Burdin-Curutcheta pass

at an altitude of 1100 metres (3600 feet). Another section, between Ayet and Esbints, would cross the Col de la Core at 1409 metres (4620 feet), and another would pass between the Canigou peak and the forest of Mariailles. All would open up districts attractive for their scenery, and tourists will no doubt approve of the scheme, though it is to be feared that it will hasten the passing away of interesting local survivals in spots which have hitherto escaped vulgarization by reason of their relative inaccessibility.

ASIA.

Mr. Raunkiær's Journey in Eastern Arabia.—News reached Copenhagen early in May of the arrival at Maskat of Mr. Barclay Raunkiær, a Danish traveller, who set out for that country in November, 1911, under the auspices of the Royal Danish Geographical Society. The explorer travelled from Aleppo *viâ* Baghdad to Basra, which he reached on January 22. From Koweit (where he was well received by the Regent), his intention was to go south to Riad in the Wahabi country, and thence to make his way back to the Persian gulf by an eastward route through the Hofuf oasis. According to the preliminary announcement he appears to have successfully carried out this programme, and to have secured valuable anthropological, zoological, and botanical observations, besides mapping the country traversed. Mr. Raunkiær is known as a writer on the geography of plants, and for a previous journey made by him in Central Tunis.

Changes in the Ganges Delta.—A paper by Mr. F. D. Ascoli in the *Journal and Proceedings, Asiatic Society of Bengal* (vol. 6, No. 10, 1910), of which a copy has only lately been received, discusses the main changes which have taken place in the delta of the Ganges since Rennell's time. The changes are naturally somewhat complex and impossible to follow in detail without the aid of comparative maps, whereas the official maps hitherto issued for this part of the country are based on old surveys, and, until the results of later surveys are made public, the necessary aid is lacking. For the critical area of the delta Mr. Ascoli makes up for this want by a couple of sketch-maps. The modern cycle of change, he insists, must be held to date back to the great flood of 1787, when, as is well known, the Tista deserted the Ganges and joined the Brahmaputra, causing the latter, too, to alter its lower course and join the Ganges west of Dacca, instead of the Megna north of that city. In saying this he seems to imply that the changes of the past century have been progressively worked out as the consequences of that event. This may, of course, be the case; but it would seem natural to suppose that fluctuations of a similar order must always have obtained near the junction of the two great rivers, even before the irruption of the Tista, though the precise manner and field of operation may no doubt have been determined by that occurrence, and no radical change in the cycle may be expected failing the recurrence of an abnormal event of equal magnitude. The main changes brought about by the event of 1787 have been the adoption by the combined Ganges and Brahmaputra of a due easterly course by way of the Kirtinassa into the Megna at Rajabari (whereas the Ganges had previously taken a much longer course to the south-south-east); and the formation of an entirely new river, the Nayabhangani, running west from the Megna further south. These were not brought about suddenly, but their consummation required a period of some thirty years dating from the irruption of the Tista. The factor introduced by that event and operative ever since has been, Mr. Ascoli holds, a tendency on the part of the Ganges-Brahmaputra to cut in a north-easterly direction, a tendency which has been especially maintained in the Rajnagar area, where the combined river has made

constant efforts to open a more northerly course to the Megna, though as constantly foiled by the action of the latter stream in forcing it to deposit its silt, and so obstruct its own course. Mr. Ascoli asks, in conclusion, whether the changes described do not militate against the theory commonly held that the rivers of the lower delta build up ridges on which to run, until they finally drop over the edge and begin the process afresh.

A Journey to the Kalabit Country, Central Borneo.—The *Sarawak Museum Journal* for February, 1912, contains an interesting account of an expedition into the country about the head of the Baram river, in the very heart of northern Borneo, on the borderland between Sarawak and Dutch territory. It is contributed by Mr. R. S. Douglas, Resident of Baram, Sarawak, to whom was lately intrusted a mission to admonish the Kalabit tribes who had been raiding and killing Sarawak subjects, and obtain guarantees of their future good behaviour. From Claudetown the route led up the Baram river and its tributary, the Tutau, the latter much broken by rapids. At Pangla, a friendly village on the borders of the Kalabit country, a curious ceremony was witnessed, the chiefs affirming their loyalty and imprecating curses on traitors to the accompaniment of furious blows on a tree-trunk placed in the midst. With a force now swelled to five hundred the party climbed the slopes of the Pemabo range, 4000 feet in relative height, and were rewarded by a splendid view over the Kalabit plain, bounded on three sides by steep ranges rising in places to 8000 feet, and itself lying at an altitude of some 2000–3000 feet above sea-level. The contrast between the white limestone of the mountain cliffs and the dark green of the tropical vegetation was very striking. In the north, the needle-like peak of Batu Lawi (*Journal*, vol. **38**, p. 530) could be distinguished. Traversing this plain to the southward, the expedition made its way by degrees to the upper Baram, peace being successfully established by negotiations at the various villages. Even the famous marauding chief, Ballang Tawi, of the Pa Kabak tribe beyond the mountains to the east, came in to make submission. The Kalabits are described as the most industrious of all the inhabitants of Borneo, except, perhaps, the Dayaks. They are the only interior people to irrigate their fields, which, at the point where the descent to the plain was made, were covered with rice in various stages of ripeness. Salt is obtained from a salt spring, the brine being boiled in large shallow cauldrons, and the coagulated salt afterwards enclosed in bamboo vessels, which are then burnt in the furnace, leaving the salt in the form of cylinders. Near the Baram the route led through the oldest jungle, absolutely untouched by man, and here the column was on one occasion charged by a large rhinoceros. The plateau of the Kalabits is described as possessing a delightful climate, and as likely to have a future as the health resort of Borneo, were communications improved.

AFRICA.

Coast Development in the Red Sea.—The broad generalization that the Red sea was formed as the result of earth movements by which a large strip of the Earth's crust was depressed considerably below the levels of the land surface on either hand, is being gradually filled in by the observations of those few observers who have the opportunity of investigating this region. In 1907 Mr. C. Crossland, Marine Biologist to the Sudan Government, communicated to the Linnean Society the conclusions at which he had arrived concerning the peculiar structure of the Red sea coasts (cf. *Journal*, vol. **31**, p. 566). This he regarded as being due to earth-movements which took place in the course of the development of the Red sea trough. In the *Journal of the Linnean Society* for

November, 1911, he returns to the subject and treats especially of the region near Khor Dongonab, which is situated on the western shore of the Red sea to the north of Suakin in about lat. 21° N. The general sequence of events in the formation of the present coast line, seems to have been, firstly, that the sandstones, etc., which overlie the ancient crystalline rocks of the Eastern Sudan were folded parallel to the Red sea fracture so as to form parallel systems of folds of which three may still be traced. Successive uplifts took place, and the coastal plain was largely aggraded by material brought down from the hills and deposited within the eroded folds of the coast ridges. This process continued until these ridges became a series of knolls of sandstone rising from the landwaste of the coastal plain, and the fracturing of some of the sharper folds has given rise to the narrow land-locked harbours which are so characteristic of this coast. A further residence in the neighbourhood of Khor Dongonab has enabled Mr. Crossland to collect many detailed observations bearing on this subject, and to investigate more closely the development of this part of the coast. The barrier reefs are a series of large areas covered with a network of reefs and shoals with deep lagoons between, which are due to earth movements, and these narrow depressions may attain a very considerable size. Khor Dongonab is such a faulted depression of very recent date. The coastal plain to the west of Dongonab bay, has along its seaward edge a line of sand-dunes formed among and to leeward of tufts of the halophyte *Suaeda Volkensii*, which grows freely in these wastes where no rain has fallen for some years. Vast quantities of sand and fine dust are carried by strong local winds blowing off shore which at times render it impossible to see objects at more than a few yards distance ; but in the writer's experience these winds extend but a short way from the shore, and he had the experience of viewing such a sandstorm while he, about five miles out at sea, had but a light breeze. Mr. Crossland finds evidence that there have been two maxima of seaward extension of the coastal plain. Blown sand has largely accumulated in the valleys, filling them in, and completing the connection of the second barrier ridge with the plain. This process is still continuing and may be seen near Dongonab. The extension of these observations to the foothills and valleys on the landward side of the plain would certainly furnish much valuable information bearing on the cycles of erosion through which this coast-line has passed.

AMERICA.

Landslip dangers on Turtle Mountain, Canadian Rockies.—In April, 1903, a destructive landslide from Turtle mountain occurred at the town of Frank, on the Crow's Nest branch of the Canadian Pacific Railway, entailing the loss of 70 lives and the destruction of much property. Grave fears having since been expressed as to the possibility of a second destructive slide (likely to be hastened, according to some, by the coal mining operations beneath the slopes of Turtle mountain), a commission was appointed last year, consisting of Messrs. R. A. Daly, W. G. Miller, and George S. Rice, to make an exhaustive examination of the locality. Their report, issued as Memoir No. 27 of the Geological Survey of Canada, tends to fully confirm previous opinions as to the dangerous situation which exists, and which renders an early removal of the township of Frank eminently desirable. It is pointed out that "Turtle mountain presents a number of peculiarities which together form a highly special combination leading to destructive falls of rock from the north peak and its vicinity." They have to do with the steepness of the mountain slopes, its somewhat complicated structure, the nature of the rocks, and the internal stresses developed within the mountain mass at the time of its upheaval. Turtle

mountain is a remnant of a great block of Palæozoic limestone, overthrust eastward upon the western limb of a syncline of Mesozoic shales, sandstones, and coal-beds. This lower member forms an unusually weak mass of rock, and matters are made worse by the inherent weakness of the limestone itself, while the total strength is seriously lessened by the presence of two zones of crumpling, with one of which the catastrophe of 1903 was evidently connected. The chief danger arises, however, from the heavy jointing of the limestone, and the precise dip of the beddings and joints. As a result of the 1903 slide many profound fissures were opened, showing movement of vast masses of rock towards the brink, while also affording deep openings into which surface water must run and be frozen at the bottom in winter. Many of the strains due to the overthrust are probably still unrelieved, while the effect of possible jars, from earthquakes or other causes, must also be considered. There is also a strong similarity of the conditions with those preceding the 1903 slide. As regards danger from mining, it is concluded that operations should not be undertaken within a specified dangerous area, at least until the township has been removed, and even then with special restrictions. The report is fully illustrated with maps, sections, and plates.

The Mississippi Delta.—In view of the obviously exceptional character of the Mississippi delta, it is singular that so little stress is laid on this in the text-books, some of which are even inclined to treat it as typical of deltas in general. A lucid account of its special features and of the causes to which they may reasonably be attributed, which Prof. E. W. Hilgard has contributed to the *Popular Science Monthly* for March of this year, is therefore particularly welcome. Prof. Hilgard's special knowledge of the Mississippi delta dates from the sixties of last century, when, during an inquiry on the rock-salt deposit on Petite Anse island, Louisiana, he carried out a careful examination of the Mississippi "passes," publishing a report on the same in the *American Journal of Science* in 1871–72, though the conclusions then arrived at appear to have lately been somewhat overlooked. Several factors must be kept in view in considering the special character of the delta. It is well known that the whole area is underlain by an impervious blue clay, usually called "blue delta clay," though, as it is not of fluviatile origin, Prof. Hilgard prefers the designation "Port Hudson clay." On the level floor formed by this clay have been deposited the sands and silts of the true delta, rarely reaching to any great depth, their shallowness being made up for by the unusually rapid extension of the mouth of the river into the gulf—an extension which it is natural to connect with the shallow-lying continental shelf running out some 30 miles beyond the present mouths of the river. But most important of all is the remarkably intractable "mudlump" clay, upheaved from the river-bottom in most of the passes of the delta, which has caused such serious obstruction to navigation in the past. Sir Charles Lyell attributed the ascent of the mud to the pressure of the overlying sands and silts, and this Prof. Hilgard accepts, while offering an explanation of the origin of the substratum of liquid mud. It is, he thinks, formed by flocculation beyond the bar, the rapid advance of the delta then covering it, and preventing an escape seaward. The mechanism of upheaval is clearly described, and, from the identity in character of this clay with that forming the extraordinarily resistent clay of the banks of the passes, the conclusion is reached that the "bird-foot" form of the delta, and the absence of subsidiary interlacing channels, are the outcome of the formation and destruction of the mud-lumps as the river progressed; some influence being also allowed to the somewhat similar Port Hudson clay.

These conditions have an important practicable application. Owing to the obstruction by mud-lumps of all the passes except the South pass, the decision was reached some thirty years ago, at the instance of Captain James Eads, to divert the main flow of the river into the latter pass. Prof. Hilgard then suggested that the eventual result must be to induce the formation of mud-lumps in the South pass, and this, he says, has lately taken place, obstructions having appeared in the channel, and caused great difficulties to those responsible for keeping this open by dredging.

Prof. Bingham's New Expedition to Peru.—A new expedition organized under the auspices of Yale University and the National Geographic Society will, we are informed by its leader, continue during 1912 the work of the Yale expedition of 1911 (*Journal*, March, 1912, p. 225), pursuing intensive work in districts where reconnaissance only was effected last year. In the field of topography it is hoped to map the Cuzco basin on the scale of 2 miles to the inch; to connect the previous Vilcabamba survey with the trans-Andean cross-section; to complete the map of the Vilcabamba country north of Cuzco, between and including the valleys of the Apurimac and Urubamba; to map the routes connecting the later Inca capital of Vitcos with the rest of Peru; and to identify the places mentioned in the early chronicles, particularly with reference to the thirty-five years of Inca rule after the advent of Pizarro. The geological tasks to be undertaken are: a survey of the Cuzco basin, with special reference to the age of the deposits in which remains were found in 1911; and a reconnaissance of the Vilcabamba country, in continuance of last year's work. In meteorology, it is hoped to establish and equip stations at Cuzco and Santa Ana, and to supplement the observations at these by field observations wherever practicable. Work will also be done in relation to the distribution of disease, and studies will be made of the bone deposits, the forest resources (in the Vilcabamba region), and of the anthropology and archæology of the regions visited. Besides continuing the investigation of the ruins discovered in 1911, Prof. Bingham hopes to carefully examine the region round about and north from Cuzco and Pisac, and to search further afield, in the Pampaconas valley jungles and beyond, for other remains of Inca occupation. The leader will be accompanied by six scientific experts, including Prof. H. E. Gregory as geologist, and Mr. A. H. Bumstead as topographer.

AUSTRALASIA AND PACIFIC ISLANDS.

"Barisal Guns" in Australia.—The problem suggested by the mysterious detonations reported from various parts of the world, but generally known as "Barisal guns," from the locality in the Ganges delta which supplies a well-known instance of the phenomenon, is once more brought forward in a paper by Dr. J. D. Cleland, published in the *Journal and Proceedings of the Royal Society of New South Wales*, 1911, pt. ii. Neither the paper nor the discussion which followed appears to carry us much nearer a complete explanation of the puzzle, but they are useful as bringing together a considerable body of data on the subject, in the form of records of such phenomena observed in Australia, where they appear to be unusually numerous, the noises being frequently known as "desert sounds." The paper also refers to correspondence on the subject in *Nature*, in 1895–96. Among the explanations which have been offered, those which have found most favour attribute the sound to (*a*) surf-rollers; (*b*) the falling in of river-banks; (*c*) earthquake shocks; (*d*) the sudden splitting of rocks intensely heated by the sun. The last would seem the most plausible in the case of Australia, where the instances have mostly

occurred at long distances from the sea. Elsewhere another explanation must possibly be sought, the occurrence having often been noted in the vicinity of large sheets of water, as, *e.g.* on the shores of Lough Neagh. The association of the sounds with desert regions may be due merely to the absence there of other sounds with which they might be blended, or of human activities to which they might be attributed.

POLAR REGIONS.

Proposed Expeditions across the Inland Ice of Greenland.—Energetic action is on foot in various quarters with a view to shedding new light on the imperfectly-known icy interior of Greenland. Apart from the traverses of Nansen in the south and Peary in the far north, the whole interior of the vast island is still a complete *terra incognita*, while its investigation is likely to supply valuable results in various sciences, particularly glaciology and meteorology. Among recent explorations on the fringe of the interior ice-sheet the most interesting have been those of the *Danmark* Expedition under the unfortunate Mylius Erichsen in 1906-08, and it is a member of this expedition, Captain J. P. Koch, who now proposes to continue his previous work by a more extended journey, the programme of which is outlined by him in the *Tijschrift* of the Danish Geographical Society (1912 Hefte 5, with sketch-map) and also in *Petermanns Mitteilungen* for May. He points out some of the problems suggested by the experiences of the former expedition. The mountains of Queen Louise Land, forming the outer rampart of the unknown interior, and presenting an exact counterpart of those of Scandinavia towards the close of the ice-age, surprised the travellers by their relatively abundant life, and by the fact that summer made its advent and streams began to flow about a month earlier than on the neighbouring coast. The causes of this are to seek, and the constitution of the fauna and the conditions of its existence are to be studied, while much remains to investigate of the mechanism of glaciation in that region. To carry out these objects it is necessary to push farther inland, and to spend a winter in that region, which Captain Koch therefore proposes to do. He will sail from Iceland about July 1, taking with him fifteen Iceland ponies, but no dogs. He hopes to reach Danmark Harbour (see map in *Journal*, vol. **33**, p. 116) about August 1, and, transporting the supplies on pony-back to a point on the west side of Queen Louise Land, to establish winter quarters there early in November. The winter will be spent in scientific work, and after some excursions in March and April it is hoped to make a start across the ice-sheet about May 1, and to reach the west coast at Salmon fjord about the beginning of July. Captain Koch will be accompanied by Drs. Wegener (meteorologist) and Lundager (botanist), who were also members of the expedition of 1906–8. A second proposed expedition across the Greenland interior is that of M. A. de Quervain, a young Swiss meteorologist who has already had experience on the inland ice of Greenland. His programme, which is outlined in *Le Globe* (Geneva Geographical Society), No. 1, 1912, provides for a crossing from Holstenborg on the west coast to Angmagsalik on the east, by a line considerably to the north of Nansen's. According to plans, Holstenborg would be reached about May 25 of this year, the start for the interior being made by the leader and three companions, with four sledges and twenty-five dogs, and with an escort for the first part of the way, on June 15. By taking an escort until the difficult marginal zone is passed, Dr. de Quervain thinks that his chance of success will be increased, while by starting two months earlier than Nansen he hopes to obtain better conditions of snow. Angmagsalik, where a depôt has

already been established, should be reached about August 1, the return voyage being made by steamer in September and October. Two of Dr. de Quervain's associates, Dr. Stolberg and Prof. Mercanton, will return to the west coast with the escort and continue the scientific work through the winter in about Lat. 70°. In this way it is hoped to secure simultaneous observations of the upper air currents from Greenland, Iceland, and Spitsbergen.

The Political Status of Spitsbergen.—It is announced that the Conference on this subject between representatives of Russia, Sweden, and Norway, which, after being talked of for several years, lately met at Christiania, has agreed upon a draft convention, according to which Spitsbergen will be a neutral territory open to all nations, but administered by a joint board consisting of one representative of each of the contracting powers. Taxes are to be levied by the board, but only with the approval of the respective Governments.

GENERAL.

Geography and its Methods.—In the first three numbers of *Petermanns Mitteilungen* for the present year Mr. E. Banse undertakes once more an inquiry into the scope and methods of geography, of which he claims to have arrived at an entirely new conception. This claim is a somewhat remarkable one, and becomes more surprising if we examine the articles themselves, the leading ideas in which, so far from being new and original, seem to correspond closely with those now entertained in all countries in which the subject is being studied from the modern standpoint. His fundamental conception of geography as "die einheitliche Philosophie der Erdhülle" is illustrated by the statement that to practise geography is not to investigate the constituents of the Earth's crust in themselves, but to answer the questions, Where? In what connection, and Why? Consequently?—essentially the same series of questions as was used by Mr. Mackinder to illustrate the method of geography so far back as 1887 (*Proc. R.G.S.*, vol. 9, p. 147). Any novelty in Mr. Banse's views consists rather in what he considers as the implications of his fundamental conception. He holds that there is no place in geography proper for "general geography," inasmuch as what is set forth under this head is merely an inadequate substitute for the systematic study of geology, botany, zoology, anthropology, etc., which is absolutely essential to the training of the geographer, whose proper sphere is the study of regional geography (Länderkunde). In his view, too, the only admissible divisions of the subject are those in accordance with regional units, depending on what he calls the *milieu* or the totality of geographical factors—the sum of the characteristics, external or qualitative, which distinguish any portion of the Earth's crust. The old division of the world into continents must be given up in favour of a new division into primary and secondary units in accordance with this principle, and this Mr. Banse attempts to supply in a map accompanying the first of his articles. Here again he is on more or less similar ground to that covered by Dr. Herbertson in his discussion of Natural Regions, though the subdivision is on somewhat different lines and is not carried so far. Some of the names of the continents are retained, but with a new application. Thus, Europe has its eastern boundary running from Lake Onega to the mouth of the Danube; America occupies that part of North America east of the Rockies, the remainder being designated Great California. Central and South America are together somewhat similarly divided into Amazonia and Andina. The countries south and east of the Mediterranean are named the Orient, Africa south of the Sahara being distinguished as Nigritia. India is used to cover the two Indian peninsulas with the Malay region, and so

on. It may be doubted, however, whether geographers will always accept Mr. Banse's divisions, for as there is transition everywhere opinions will differ as to the precise position at which the dividing lines should be drawn. Thus, to take the case of Europe, the transition is certainly more gradual, as regards factors favourable to civilization, where Mr. Banse draws his line of separation from Great Siberia, than where the eastern limit of Europe is traditionally placed. Great California, again, embraces the utmost diversity of physical features, climate, and vegetation, and has no distinctive community of geographical factors apart from the temporary one of gold production.

Kerguelen Island.—With reference to the map of this island in the May number of the *Journal*, we are asked by Commander Ring to state that the surveys on the east coast north of Long island were not by himself, but by Captain R. Rallier du Baty.

The Gill Memorial Award.—In our statement last month of the annual awards of the Society for 1912, an accidental error was made in speaking of the grant of the Gill Memorial to Captain Bailey. This officer did not take part in the Tibet expedition as assistant to Major Ryder, but was personally attached to Captain Rawling, the leader of the expedition.

Optical Convention, 1912.—This convention will hold its sittings in the Lecture Hall of the Imperial College of Science and Technology, South Kensington, from June 19 to June 26. The programme consists of the reading of papers, demonstrations, and receptions, and an exhibition of optical and allied instruments has also been arranged. The office is at 39, Victoria Street, S.W.

OBITUARY.

George Borup.

A LAMENTABLE accident has closed the promising career of Mr. George Borup, the Arctic explorer whose proposed expedition to Crocker Land, in conjunction with Prof. D. B. Macmillan, has several times been referred to in the *Journal* (see p. 402, *ante*). He was drowned on one of the last days of April by the upsetting of a canoe in Long Island sound. Although still quite a young man, Mr. Borup had impressed all who knew him with his exceptional qualifications for the work in hand. No sooner had he returned from the Peary North Pole expedition, than he began to fit himself for further scientific work by taking up the advanced classes at his university, and he had joined the United States Geological Survey and gained six months' experience in the field under the officers of that department. He would therefore have been thoroughly competent to tackle the geological problems which were to have been studied during the proposed expedition. He had also made himself an expert astronomical observer, and had been continuing his studies in another field in the American Museum of Natural History at Washington. He was a noted Yale University athlete as well as an excellent photographer, and his services during Peary's North Pole expedition were cordially recognized by his chief. He had joined this Society only last year. We have at present no information as to whether or not the arrangements for the expedition will be cancelled on account of this melancholy occurrence.

CORRESPONDENCE.

Glasgow, May 10, 1912.

Climatic Limits of Wheat Cultivation.

With reference to Dr. Unstead's paper on the "Climatic Limits of Wheat cultivation" in the May number of the *Geographical Journal*, and Mr. Kitson's remarks thereon, may I say that wheat is grown at the present day in many parts of Northern Nigeria. I have frequently used as an article of food wheaten meal of native production, and I am now sorry that I did not record systematically the various localities in which it may be obtained. Barth, however, in his 'Travels in Central Africa,' gives numerous references to the cultivation of wheat in Bornu, and mentions also the production of both wheat and barley in the neighbourhood of Timbuktu.

There is little doubt that large tracts of country in the Benue valley, in Hausaland, and in Bornu are suitable for the cultivation of wheat. Extensive stretches of these lands are annually flooded during the rains, and owing to the nature of the soil undergo a very gradual desiccation at the beginning of the dry season.

J. D. Falconer.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1911-1912.

RESEARCH DEPARTMENT.

April 18, 1912.

"Study of Morocco." By A. Grant Ogilvie.

Twelfth Meeting, April 22, 1912. Major Leonard Darwin, Vice-President, in the Chair.

Elections.—*Otto Beit; R. P. Bishop; Miles Arthur Hall; Charles Fredk. Wm. Halliley; George L. Harrison; Walter Hutchinson; Robert Wylie Lloyd; David Williamson Moncur; James Henry Worthington, M.A.; Frederic Bosworth Scammell.*

The paper read was:—

"Southern Nigeria." By A. E. Kitson.

Thirteenth Meeting, May 6, 1912.—Earl Curzon of Kedleston, G.C.S.I., etc., President, in the Chair.

Elections.—*Hugh Potter Baker; Major Brereton Dew, C.I.E. (Indian Army); Carl Eberstein; Akhrur Ardeshir Engineer, M.A., LL.B.; S. W. Dorsey; E. English; John Calvin Fergusson; F. W. Grantham; Edward B. Hart; Colonel John Grasson Harwood; Captain Charles Edward Heartt; Piroshaw Bomanji Jujeebhoy Jujeebhoy; Captain G. W. R. Jenkins; Ronald Johnstone, C.E.; Lieut. C. T. Kergwin, R.N.R.; John H. M. Kirkwood; W. Forbes Leslie; Herbert James Ling; Osborne W. Morgan; Donald Baxter Macmillan; Rev. Henry Edward Newton; Captain Lawrence; Edward Grace Oates; Richard Hubert Pybys; Alfred Richard C. Richings; Lieut. Hugh Jas. Paterick Segrave (Wiltshire Regt.); Alex. John Stewart; Kung Tien-ch'eng; Alfred Marston Tozzer; Captain James Leslie Rose Weir, I.A.; Captain John Henry Reginald Yardley (Royal Inniskilling Fusiliers).*

The paper read was:—

"United Nigeria." By C. L. Temple, C.M.G. (Secretary of Northern Nigeria Protectorate).

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
Jber. = Jahresbericht.
k.k = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Adriatic—Tides. **Ufficio Idrografico.**

R. Magistrato alle Acque; Ufficio Idrografico, Pubblicazione N. 32. Sulla precisione delle osservazioni mareografiche nella Stazione di secondo ordine di Porto Caleri. Venice, 1911. Size 10½ × 7, pp. 18. *Diagrams.*

Alps—Geology. *Geol. Charakterbilder* (*Stille*) (1911): Heft 9, 6 *Plates.* **Geyer.**

Die karnische Hauptkette der Südalpen. Von G. Geyer.

Austria—Cracow. **Lepszy.**

Cracow; the Royal Capital of Ancient Poland: its history and antiquities. By Leonard Lepszy. London: T. Fisher Unwin, 1912. Size 10 × 7½, pp. xvi. and 210. *Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

Austria—Dalmatia—Glaciation. *Z. Gletscherkunde* 5 (1911): 339–355. **Sawicki.**

Die eiszeitliche Vergletscherung des Orjen in Süd-Dalmatien. Von Ludomir R. v. Sawicki. *Map and Illustration.*

Austria—Magnetic observations. **Kesslitz.**

Veröffentlichungen des Hydrographischen Amtes des K. und K. Kriegsmarine in Pola; Gruppe V. Ergebnisse aus den erdmagnetischen Beobachtungen in Pola (1847–1909). Von Kapt. Wilhelm von Kesslitz. Pola, 1911. Size 13½ × 10, pp. 74. *Diagrams.*

Carparthians. **Phillimore.**

In the Carparthians. By [Mrs.] Lion Phillimore. London: Constable & Co., 1912. Size 9 × 6, pp. 348. *Sketch-map. Price* 10*s.* 6*d. net. Presented by the Publishers.*

Carpathians—Glaciation. *M. k.k. G. Ges. Wien* 54 (1911): 510–571. **Sawicki.**

Die glazialen Züge der Rodnaer Alpen und Marmorischer Karpaten. Von Dr. Ludomir Ritter v. Sawicki. *Maps.*

Denmark—Færoes. *G.Z.* 17 (1911): 601–618. **Küchler.**

Land und Leute der Færöer. Von Carl Küchler. *Map.*

France—North-West. **Merk.**

The Normandy Coast. By Charles Merk. London: T. Fisher Unwin, 1911. Size 8 × 5, pp. 370. *Illustrations. Price 6s. net. Presented by the Publisher.*

Germany—Bavaria. *M.G. Ges. München* **6** (1911): 337–385. **Arlt.**

Die geologischen Verhältnisse der östlichen Ruhpoldinger Berge mit Rauschberg und Sonntagshorn. Von Hans Arlt. *Maps, Sections, and Illustrations.*

Germany—Frontiers. *G. Anzeiger* **12** (1911): 150–152, 175–178. **Schmidt.**

Deutschlands Grenzen in ihrer verkehrsgeographischen Bedeutung. Von Dr. Everhard Schmidt. *Map.*

Germany—Glacial deposits. *Z. Gletscherkunde* **5** (1911): 321–338. **Wahnschaffe.**

Ueber die Gliederung der Glazialbildungen Norddeutschlands und die Stellung des norddeutschen Randlösses. Von Felix Wahnschaffe.

Germany—Historical. *G.Z.* **17** (1911): 665–675. **Beckers.**

Vom germanischen Norden in seiner frühesten geschichtlichen Zeit: Wattenzone, Mentonomon, Abalos. Von W. J. Beckers.

Germany—Ports. *G.Z.* **17** (1911): 517–529, 565–577, 685–703. **Oppel.**

Die deutschen Seestädte an der Nord- und Ostsee. Ein wirtschaftsgeographischer Vergleich. Von A. Oppel.

Germany—Prussia—Posen. *G. Anzeiger* **12** (1911): 169–173. **Dalchow.**

Die Entstehung und räumliche Entwicklung der Stadt Posen. Von Dr. Otto Dalchow. *Plan and Illustrations.*

Greece—Thessaly—Archæology. **Wace and Thompson.**

Prehistoric Thessaly: being some account of recent excavations and explorations in North-Eastern Greece from Lake Kopais to the borders of Macedonia. By A. J. B. Wace and M. S. Thompson. Cambridge: University Press, 1912. Size 12½ × 9½, pp. xvi. and 272. *Sketch-map and Illustrations. Price 18s. net. Presented by the Publishers.*

Iceland. **Knebel.**

Island: eine naturwissenschaftliche Studie. Von Dr. W. von Knebel, . . . bearbeitet und herausgegeben von Dr. Hans Reck. Stuttgart: E. Schweizerbart, 1912. Size 10 × 6½, pp. 290. *Map and Illustrations. Price 7s. 6d.*

Italy—Calabria—Relief. *B.S.G. Italiana*, V. **1** (1912): 48–57. **Azzi.**

Sopra una depressione subseguente periferica in Calabria. Del dott. Girolamo Azzi. *Sketch-map and Diagram.*

Italy—Ethnology. **Reše̊tar.**

Die serbokroatische Kolonien Süditaliens. Von Milan Reše̊tar. (K. Akademie der Wissenschaften; Schriften der Balkankommission; Linguistische Abteilung I.: Südslawische Dialektstudien, Heft 5.) Vienna: A. Hölder, 1911. Size 12 × 9½, pp. 402. *Illustrations. Price 12.50m. Presented by the Publisher.*

Italy—Venetia. **Williams.**

Plain-towns of Italy: the cities of old Venetia. By Egerton R. Williams. London: Smith, Elder & Co., 1912. Size 8½ × 5½, pp. xxiv. and 604. *Map and Illustrations. Price 12s. 6d. net. Presented by the Publishers.*

Mediterranean. **Ludwig Salvator.**

Sommerträumereien am Meeresufer. [By H.H. the Archduke Ludwig Salvator.] Prague: H. Mercy Sohn, 1912. Size 8 × 5½, pp. viii. and 98. *Presented by the Author.*

Norway. **Simpson.**

Rambles in Norway. By Harold Simpson. London: Mills & Boon, [1912]. Size 8 × 5, pp. xii. and 244. *Illustrations. Price 6s. Presented by the Publishers.*

Norway—Nordland. **Marstrander.**

Svartisen. Strøgets morfologi og braeerne. Af Rolf Marstrander. (Extract from *Archiv for Mathematik og Naturvidenskab*, B. 31, Nr. 8, 1911.) Christiania, 1911. Size 9½ × 6½, pp. 40. *Map, Sections, and Illustrations.*

Studies of the morphology and glaciers of the Svartisen region.

Norway and Sweden. **Aall and Gjelsvik.**

Die norwegisch-schwedische Union: ihr Bestehen und ihre Lösung. Ein Beitrag zur allgemeinen Staatslehre auf geschichtlicher Grundlage. Von Dr. Anathon Aall und Dr. Nikolaus Gjelsvik. Breslau: M. & H. Marcus, 1912. Size 9½ × 6¼, pp. x. and 414. *Presented by the Authors.*

Portugal. **Baker.**

A Winter holiday in Portugal. By Captain B. Granville Baker. London: S. Paul & Co., [1912]. Size 9 × 5½, pp. 324. *Illustrations. Price 12s. 6d. net. Presented by the Publishers.*

Pyrenees. *B.R.S.G. Madrid* **53** (1911): 81–119, 170–194, 257–282, 449–486. **Briet.**

El Valle de Ordesa. Por Luciano Briet. *Illustrations.*

Rhine. **Clapp.**

The navigable Rhine: the development of its shipping, the basis of the prosperity of its commerce and its traffic, in 1907. By Edwin J. Clapp. London: Constable & Co., 1911. Size 8½ × 5, pp. xviii. and 134. *Sketch-map and Illustrations. Price 5s.*

Russia—Towns and villages. **Semenof-Tian-Shansky.**

Zapiski, Imp. Russian G.S., Statistics Br. **10** (1910): 1–212.

Towns and villages in European Russia. An essay in economic geography. By Benjamin Semenof-Tian-Shansky. *Maps.* [In Russian.]

Noticed in vol. **38**, p. 72.

Scandinavia—Structure. *Naturw. Wochenschrift* **10** (1911): 449–453. **Seidlitz.**

Ueber den Aufbau der skandinavischen Gebirge. Von Dr. W. von Seidlitz. *Sketch-map, Sections, and Illustrations.*

Spain—Balearic islands. *B. Jber. G. Ges. Greifswald*, 1911–12: 19–106. **Praesent.**

Bau und Boden der Balearischen Inseln. Beiträge zur Landeskunde der Inselgruppe. Von Dr. Hans Praesent. *Sketch-map and Illustrations.*

Switzerland. **D'Auvergne.**

Switzerland in sunshine and snow. By Edmund B. D'Auvergne. London: T. Werner Laurie, [1912]. Size 9 × 6, pp. viii. and 308. *Illustrations. Price 12s. 6d. net. Presented by the Publisher.*

Switzerland—Alpine huts.

Klubhütten-Album des Schweizer Alpen-Club. (Beilage zum Jahrbuch S. A. C. Bd. 46.) [Zürich], 1911. Size 7½ × 10½, pp. 118. *Sketch-maps, Plans, and Illustrations. Presented by the Swiss Alpine Club.*

Switzerland—Climatology. **Gautier.**

Le Globe, Mém. S.G. Genève **50** (1911): 33–58.

Quelques anomalies climatologiques à Genève. Hivers chauds, années très humides et très sèches. Par Raoul Gautier. *Diagrams.*

Switzerland—Geology. **Beck.**

Beiträge Geol. Karte Schweiz **29** (1911): pp. x., 100, and xiv.

Geologie der Gebirge nördlich von Interlaken. Von Paul Beck. *Sections and Illustrations.*

Switzerland—Geology. **Blumenthal.**

Beiträge Geol. Karte Schweiz **33** (1911): pp. 72 and xiv.

Geologie der Ringel-Segnesgruppe. Von Moritz Blumenthal. *Sections and Illustrations.*

Switzerland—Hydrology. *Jb. Schweizer Alpenclub* **46** (1910): 199–227. **Meisser.**

Die Nolla und die Geschichte ihrer Verbauung. Von S. Meisser. *Map and Illustrations.*

See note in vol. **37**, p. 562.

United Kingdom—Archæology. **Johnson.**

Byways in British Archæology. By Walter Johnson. Cambridge: University Press, 1912. Size 9 × 5½, pp. xii. and 530. *Illustrations. Price 10s. 6d. net. Presented by the Publishers.*

United Kingdom—Brecon. **Evans.**

Cambridge County Geographies (edited by Dr. F. H. H. Guillemard). Breconshire. By Christopher J. Evans. Cambridge: University Press, 1912. Size

7½ × 5, pp. xii. and 172. *Maps, Diagrams, and Illustrations. Price* 1*s.* 6*d. Presented by the Publishers.*

United Kingdom—Canterbury. **Taylor.**

The story of Canterbury. By G. R. Stirling Taylor. (Mediæval Towns Series.) London: J. M. Dent & Sons, 1912. Size 7 × 4½, pp. 390. *Plans and Illustrations. Price* 4*s.* 6*d. net. Presented by the Publishers.*

United Kingdom—London. **Besant.**

London South of the Thames. By Sir Walter Besant. London: A. & C. Black, 1912. Size 11½ × 9, pp. xiv. and 379. *Plans and Illustrations. Price* 30*s. net.*

United Kingdom—London. **Bosworth.**

Cambridge County Geographies (edited by Dr. F. H. H. Guillemard). West London. By G. F. Bosworth. Cambridge: University Press, 1912. Size 7½ × 5, pp. xii. and 268. *Maps, Diagrams, and Illustrations. Price* 1*s.* 6*d. Presented by the Publishers.*

United Kingdom—London. **Gomme.**

The making of London. By Sir Laurence Gomme. Oxford: Clarendon Press, 1912. Size 7½ × 5, pp. 256. *Illustrations. Price* 3*s.* 6*d. net. Presented by the Publishers.*

United Kingdom—Norfolk—Bure. **Gurney.**

The tides of the River Bure and its tributaries. By Robert Gurney. (Reprinted from the *Transactions of the Norfolk and Norwich Naturalists' Society*, vol. 9.) [Norwich, 1911.] Size 8½ × 5½, pp. 216–244. *Map, Chart, and Diagrams.*

This subject was dealt with briefly by Mr. Gurney at a research meeting of the Society in 1911 (*Journal*, vol. 37, p. 292).

United Kingdom—Norfolk—Bure. **Innes.**

Tidal action in the Bure and its tributaries. By Dr. A. G. Innes. (Reprinted from the *Transactions of the Norfolk and Norwich Naturalists' Society*, vol. 9.) [Norwich, 1911.] Size 8½ × 5½, pp. 244–262.

United Kingdom—Oxford. **Ditchfield.**

Cambridge County Geographies (edited by Dr. F. H. H. Guillemard). Oxfordshire. By P. H. Ditchfield. Cambridge: University Press, 1912. Size 7½ × 5, pp. xii. and 218. *Maps, Diagrams, and Illustrations. Price* 1*s.* 6*d. Presented by the Publishers.*

United Kingdom—Scotland. *Scottish G. Mag.* **27** (1911): 632–643. **Mort.**

The sculpture of the Goat Fell Mountain Group. By Frederick Mort. *Sketch-map, Sections, and Illustrations.*

United Kingdom—Scotland—Rainfall. *G. Scottish Met. S.* **15** (1911): 273–294. **Watt.**

The Mean Annual Rainfall of Scotland, 1871–1910. By Andrew Watt. *Sketch-maps.*

See May number, p. 487.

United Kingdom—Yorkshire. **Clark.**

P.S. Antiquaries, Ser. II. **23** (1910–11): 309–333.

A prehistoric route in Yorkshire. By E. Kitson Clark. *Maps and Illustrations.*

ASIA.

Arabia—Environment. *J.G.* **10** (1912): 169–175. **Huntington.**

The Arabian Desert and human character. By Ellsworth Huntington.

Central Asia—Exploration. **Rieger.**

Sven Hedins **Anteil** an der Erforschung Zentralasiens. Von Max Rieger. Cologne, 1911. Size 9½ × 6, pp. 116. *Map.*

China. **Borel.**

The new China: a traveller's impressions. By Henri Borel. London: T. Fisher Unwin, 1912. Size 9 × 6, pp. 282. *Illustrations. Price* 10*s.* 6*d. Presented by the Publishers.*

China. **Colquhoun.**

China in transformation. By Archibald R. Colquhoun. Revised edition. London, etc.: Harper & Bros., 1912. Size 8 × 5, pp. viii. and 300. *Maps. Price* 5*s. net. Presented by the Publishers.*

China. **Douglas.**
China. By Sir Robert K. Douglas. 4th edit., brought up to date by Ian C. Hannah. ("The Story of the Nations" Series.) London: T. Fisher Unwin, 1912. Size 8 × 5¼, pp. xx. and 492. *Sketch-map and Illustrations. Price 5s. net.*

China. **Luigi.**
La Cina contemporanea: viaggio e noti. Di Giuseppe de' Luigi. Milan: Fratelli Treves, 1912. Size 10 × 6½, pp. 290. *Sketch-map, Plan, and Illustrations. Presented by the Author.*

China—Cartography. *M.F. von Richthofen-Tages* (1911): 62–70. **Groll.**
Aus der Werkstatt des Kartographen. Von M. Groll. *Map.*

China—Eastern. **Schulze.**
M. Seminars Oriental. Sprachen Berlin **14** (1911): I. Abt., 1–56.
Von Tsingtau nach Nanking. Von Dr. Joachim Schulze. *Map and Illustrations.*

China—Geology. *M.F. v. Richthofen-Tages* (1911): 38–61. **Frech.**
Die geologische Entwicklung China. Von Fritz Frech.

China—Kwantung. **Lan-hsün.**
M. Seminars Oriental. Sprachen Berlin **14** (1911): I. Abt., 57–98.
Pakhoi. Von Liang Lan-hsün.

China—South-West. *M.F. von Richthofen-Tages* (1911): 1–38. **Tiessen.**
Das südwestliche China. Auf Grund der Hauptergebnisse der ersten Abteilung des III. Bandes von F. v. Richthofens "China." Von E. Tiessen.

China—Yunnan. *B.G.S. Philadelphia* **10** (1912): 1–35. **Stout.**
The penetration of Yun-nan. By Arthur Purdy Stout. *Map and Illustrations.*

Chinese Empire—Mongolia. *Iz. Russ. G.S.* **47** (1911): 207–235. **Chernof.**
The Alashan Range. By A. Chernof. *Illustrations.* [In Russian.]

Chinese Empire—Mongolia. *Iz. Russ. G.S.* **46** (1910): 323–355. **Vladimirtsof.**
A visit to the Derbets of Kobdo. By B. Y. Vladimirtsof. [In Russian.]

Chinese Empire—Mongolia. **Saposhnikof.**
L'Altai mongolien aux sources de l'Irtych et du Kobdo. Par le Dr. V. V. Saposhnikof. Tomsk, 1911. Size 10½ × 7, pp. xvi. 408, and 8. *Maps and Illustrations. Price 15s. 6d.* [In Russian; *résumé* in French.]

Eastern Asia—Yalu. *Ann. Hydrographie* **39** (1911): 438–445. ———
Der Amunyoku Kan oder Yalu-Fluss und seine Häfen.

French Indo-China—Climate. *B. Économique (Indo-Chine)* **14** (1911): 757–776. **Cadet.**
Résultats des observations météorologiques faites à l'Observatoire Central de l'Indochine. Le Climat du Delta du Tonkin. Par G. Le Cadet.

India—Administrative changes. ———
East India Coronation Durbar. Announcements by and on behalf of His Majesty the King-Emperor at the Coronation Durbar held at Delhi on 12th December, 1911, with correspondence relating thereto. London: Wyman & Sons, 1911. Size 13 × 8½, pp. 22.
See note in the January number, p. 70.

India—Bengal—Fisheries. *J.R.S. Arts* **60** (1911): 146–166. **Jenkins.**
The Fisheries of Bengal. By Dr. J. Travis Jenkins. *Sketch-chart.*

India—Burma. **Crosthwaite.**
The pacification of Burma. By Sir Charles Crosthwaite. London: E. Arnold, 1912. Size 9 × 5½, pp. xii. and 356. *Maps and Illustrations. Price 16s. net.*

India—Frontiers. *Imp. Asiatic Quart. Rev.* **33** (1912): 62–79. **Holdich.**
The Gates of India. By Sir T. Holdich.

India—Himalaya. **Filippi.**
S. A. R. il Principe Luigi Amedeo di Savoia, Duca degli Abruzzi. La spedizone nel Karakoram e nell' Imalaia Occidentale, 1909. Relazione del Dott. Filippo de Filippi. Bologna: N. Zanichelli, 1912. Size 10½ × 8, pp. xiv. 472, and 112. *Illustrations and separate Case of Maps and Panoramas. Presented by H.R.H. the Duke of the Abruzzi.* [See Review, *ante*.]

India—North-West Frontier. **Nevill.**

Campaigns on the North-West frontier. By Captain H. L. Nevill. London: J. Murray, 1912. Size 9 × 4½, pp. xx. and 414. *Maps. Price* 15*s. net. Presented by the Publisher.*

India—Punjab. **General Staff, India.**

The First and Second Sikh Wars, compiled for the General Staff, India, by Lieut.-Colonel R. G. Burton. Simla, 1911. Size 10 × 6½, pp. iv. and 148. *Map and Plans. Presented by the General Staff, Simla.*

Japan—Climate. *J. College Sc. Imp. Univ. Tokyo* **32** (1911): Art. 5, pp. 16. **Yokoyama.**

Climatic changes in Japan since the Pliocene Epoch. By Matajiro Yokoyama. *Sketch-map and Illustrations.*

Noticed in the Monthly Record, May, p. 496.

Malay Archipelago—Languages. **Brandstetter.**

Renward Brandstetters Monographien zur indonesischen Sprachforschung. VIII: Gemeinindonesisch und Urindonesisch. Lucerne, 1911. Size 9½ × 7, pp. 46.

Russia—Siberia. **Stolypin and Krivoschein.**

Die Kolonisation Sibiriens: eine Denkschrift. Von P. A. Stolypin und A. W. Kriwoschein. Berlin: H. Paetel, 1912. Size 10 × 8, pp. viii. and 164. *Sketch-map. Price* 5*s.*

Turkey—Jerusalem. **Reynolds-Ball.**

Jerusalem: a practical guide to Jerusalem and its environs. By Eustace Reynolds-Ball. 2nd edit. London: A. & C. Black, 1912. Size 7 × 4½, pp. viii. and 238. *Maps, Plans, and Illustrations. Price* 2*s.* 6*d. net. Presented by the Publishers.*

Turkey—Jerusalem. **Watson.**

The story of Jerusalem. By Colonel Sir C. M. Watson. (The Mediæval Towns Series.) London: J. M. Dent & Sons, 1912. Size 7 × 4½, pp. xx. and 340. *Plans and Illustrations. Price* 4*s.* 6*d. net. Presented by the Publishers.*

Turkey—Palestine. **Cooke.**

Palestine in geography and in history. By Arthur William Cooke. Two vols. London: C. H. Kelly, 1901 [cheap re-issue, 1912]. Size 7 × 4½, pp. (vol. 1) xii. and 196; (vol. 2) xii. and 254. *Maps. Price* 2*s. net. Presented by the Publisher.*

A cheap and handy issue of a useful compendium.

Turkey—Syria—Archæology. **Hogarth.**

Hittite problems and the excavation of Carchemish. By D. G. Hogarth. (From the *Proceedings of the British Academy*, vol. 5.) London: H. Frowde, [1912]. Size 10 × 6, pp. 16. *Price* 1*s. net. Presented by the Publisher.*

AFRICA.

Africa—Railways. *Mouvement G.* **28** (1911): 571–576. **Wauters.**

Les chemins de fer Trans-Africains. Par A.-J. Wauters. *Map.*

See Monthly Record, March, p. 284.

Africa—Zoogeography. **Stevenson-Hamilton.**

Animal life in Africa. By Major J. Stevenson-Hamilton. London: W. Heinemann, 1912. Size 9½ × 6, pp. xviii. and 338. *Maps and Illustrations. Price* 18*s. net. Presented by the Publisher.*

Algeria—Ethnography. **Gennep.**

A. van Gennep. Études d'ethnographie algérienne. (Tirage à part de la Revue d'Ethnographie et de Sociologie, 1911.) Paris: E. Leroux, 1911. Size 11 × 7½, pp. 104. *Illustrations. Presented by the Publisher.*

Belgian Congo—Lake Mweru. **Stappers.**

Pêche industrielle. Rapport de la Mission d'exploration des eaux intérieures du Congo Belge. Note préliminaire sur les expériences de pêche faites au lac Moëro du 18 Août au 18 Octobre 1911. Par Dr. Stappers. (Extract from *Renseignements de l'Office Colonial, Royaume de Belgique*, No. 12, December, 1911.) Brussels, [1911]. Size 11 × 7, pp. 396–414. *Illustrations.*

See note in the Monthly Record, May, p. 490.

Egypt—Archæology. **Griffith.**

University of Pennsylvania, Egyptian Department of the University Museum; Eckley B. Coxe, Junior, Expedition to Nubia. Vol. 6. Karanòg: the Meroitic

inscriptions of Shablûl and Karanòg. By F. Ll. Griffith. Philadelphia, 1911. Size 11 × 8½, pp. x. and 182. *Illustrations. Presented by the University of Pennsylvania Museum.*

Egypt—Archæology. **Randall-MacIver and Woolley.**

University of Pennsylvania: Egyptian Department of the University Museum. Eckley B. Coxe, Junior, Expedition to Nubia. Vols. 7–8: Buhen. By D. Randall-MacIver and C. Leonard Woolley (Text and Plates). Philadelphia, 1911. Size 11 × 9, pp. (vol. 7) x. and 244; (vol. 8) x. and 103 plates. *Plans and Illustrations. Presented by the Museum.*

Egypt—Historical. **Brown.**

The Land of Goshen and the Exodus. By Sir Hanbury Brown. 2nd edit. London: E. Stanford, 1912. Size 8½ × 5½, pp. 92. *Maps. Price 3s. net. Presented by the Publisher.*

Egyptian Sudan—Red Sea Coast. **Crossland.**

J. Linnean S. (Zoology) **31** (1911): 265–286.

Reports on the Marine Biology of the Sudanese Red Sea. A physical description of Khor Dongonab, Red Sea. By Cyril Crossland. *Sketch-maps, Illustrations, and Sections.*

The spot described lies north of Port Sudan (see Monthly Record, *ante*).

German East Africa. *M. Deuts. Schutzgebieten* **24** (1911): 342–359. **Meyer**

Reiseberichte von Prof. Dr. Hans Meyer aus Deutsch-Ostafrika, II.–V.

See note in the Monthly Record, February, 1912, p. 157. The earlier reports were noticed in vol. **38**, p. 625.

German East Africa—Railway. *Deutsches Kolonialblatt* **22** (1911): 837–842. **Baltzer.**

Die Usambara-Eisenbahn. Von F. Baltzer. *Map and Profiles.*

See note in the Monthly Record, March, p. 285.

German South-West Africa. *M. Deuts. Schutzgebieten* **24** (1911): 336–341. **Seiner.**

Die Omaheke. Reisebericht von Franz Seiner.

German South-West Africa. *Deutsches Kolonialblatt* **22** (1911): 969–980. **Streitwolf.**

Eine Dienstreise ins Amboland. Bericht des Hauptmanns Streitwolf. *Sketch-map and Illustrations.*

Madeira—Historical. **Castro e Almeida.**

Bibliotheca Nacional de Lisboa. Archivo de Marinha e Ultramar: Inventario por Eduardo de Castro e Almeida. Madeira e Porto Santo; vols. 1 (1613–1819) and 2 (1820–1833). Coimbra, 1907–09. Size 15 × 11, pp. (vol. 1) xii. and 402; (vol. 2) 488. *Presented by the Compiler.*

Morocco. **Kerr.**

Morocco after twenty-five years: a description of the country, its laws and customs, and the European situation. By Dr. Robert Kerr. London: Murray & Evenden, 1912. Size 9 × 5½, pp. xvi. and 364. *Maps and Illustrations. Price 10s. 6d. net. Presented by the Publishers.*

Morocco. **Morel.**

Morocco in diplomacy. By E. D. Morel. London: Smith, Elder & Co., 1912. Size 8 × 5½, pp. xxii. and 360. *Maps. Price 6s. net. Presented by the Publishers.*

North Africa. **Picquet.**

Victor Picquet. La colonisation française dans l'Afrique du Nord: Algérie, Tunisie, Maroc. Paris: A. Colin, 1912. Size 8 × 5½, pp. x. and 538. *Sketch-maps. Price 6 fr. Presented by the Publisher.*

North Central Africa. *L'Afrique Française* **21** (1911): 320–329. **Cortier.**

Les Turcs en Afrique Centrale. La frontière Franco-Tripolitaine. Par Maurice Cortier. *Sketch-map.*

Rhodesia—Zimbabwe. *M. k.k. G. Ges. Wien* **54** (1911): 432–452. **Pöch.**

Zur Simbábye-Frage. Von Dr. R. Pöch. *Plan.*

Sahara and Sudan. **Haywood.**

Through Timbuctu and across the great Sahara. An account of an adventurous journey of exploration from Sierra Leone to the source of the Niger, following its course to the bend at Gao and thence across the Great Sahara to Algiers. By Captain A. H. W. Haywood. London: Seeley, Service & Co., 1912. Size 9 × 5½, pp. 350. *Map and Illustrations. Price 16s. net.*

South Africa—Bechuanaland.

Bechuanaland Protectorate. Report for 1910-11. (Colonial Reports—Annual, No. 696, 1911.) London, 1911. Size 9½ × 6, pp. 14.

Contains the account of a journey across the Kalahari referred to in the February number, p. 158.

Sudan. **MacLeod.**

Chiefs and cities of Central Africa: across Lake Chad by way of British, French, and German territories. By Olive MacLeod. Edinburgh, etc.: W. Blackwood & Sons, 1912. Size 10 × 6, pp. xiv. and 322. *Map and Illustrations. Price* 16*s. net. Presented by the Publishers.*

Tripoli. *B.S.G. Italiana* **12** (1911): 1345–1375. **Jaja.**

Sul valore economico della Tripolitania. Del prof. Goffredo Jaja.

Tropical Africa. *B. American G.S.* **43** (1911): 753–766. **Adams.**

Foundations of Economic Progress in Tropical Africa. By Cyrus C. Adams.

Uganda—Ethnology. **Kitching.**

On the backwaters of the Nile: studies of some child races of Central Africa. By the Rev. A. L. Kitching. London: T. Fisher Unwin, 1912. Size 9 × 5½, pp. xxiv. and 296. *Sketch-map and Illustrations. Price* 12*s.* 6*d. net. Presented by the Publisher.*

West African Islands. **Reinisch.**

Deutsch Südpolar-Expedition, 1901–03 (Drygalski), Bd. II.: pp. 641–662. Gesteine der Atlantischen Inseln St. Helena, Ascension, São Vicente (Kapverden) und São Miguel (Azoren). Von R. Reinisch. *Illustrations.*

NORTH AMERICA.

Alaska—Glaciers. *Z. Gletscherkunde* **6** (1911): 104–150. **Engeln.**

Phenomena associated with Glacier Drainage and Wastage, with especial reference to observations in the Yakutat Bay Region, Alaska. By O. D. von Engeln. *Sketch-maps and Illustrations.*

America—Danish Explorers. **Madsen.**

G. Ts., K. Danske G.S. **21** (1911): 103–112, 152–158.

De vigtigste af danske foretagne Rejser og Forskninger i Amerika. Af Emil Madsen.

Americanist Congress. **Heger.**

Die beiden Sessionen des xvii. Internationalen Amerikanisten-Kongresses (Buenos Aires und Mexico, 1910). Von Franz Heger. (Sonderabdruck aus Bd. xli. der Mitteilungen der Anthropologischen Gesellschaft in Wien.) Vienna, 1911. Size 11½ × 8, pp. 22.

Canada. **Department of Naval Service.**

Report of the Department of the Naval Service for the fiscal year ending March 31, 1911. Ottawa, 1911. Size 10 × 6½, pp. 56. *Maps and Illustrations.*

Includes reports on hydrographical and tidal surveys, etc. (see April number, p. 399).

Canada—Eskimo. **Mavor.**

The Eskimo of the MacKenzie River District. Mr. Stefánsson's expedition. By James Mavor. (Extract from the *University Monthly*, vol. **12**, December, 1911.) Toronto, 1911. Size 9½ × 6, pp. 75–79.

Relates to the investigation of Messrs. Stefánsson and Anderson (*Journal*, vol. **38**, p. 626).

Canada—Historical. **Lescarbot and Grant.**

The history of New France. By Marc Lescarbot. With an English translation, notes and appendices by W. L. Grant. Vol. 2. (The publications of the Champlain Society, vol. 7.) Toronto, 1911. Size 10 × 6½, pp. iv. and 584. *Maps (facsimile and original).*

Canada—Labrador. **Cartwright and Townsend.**

Captain Cartwright and his Labrador Journal. Edited by Charles Wendell Townsend; with an Introduction by Dr. Wilfred T. Grenfell. London: Williams & Norgate, [1911]. Size 8½ × 5½, pp. xxxiv. and 386. *Facsimile-map and Illustrations. Price* 5*s. net. Presented by the Publishers.*

The Journal, published in three volumes 4to in 1792, is now scarce.

Canada—New Brunswick. *B. Nat. Hist. S. New Brunswick* **6** (1911): 321–337. **Ganong.**

Notes on the natural history and physiography of New Brunswick. No. 120. On the physical geography of Bartholomew River. By W. F. Ganong. *Sketch-maps.*

CENTRAL AND SOUTH AMERICA.

Argentine—Chubut. **Vallentin.**

Chubut: im Sattel durch Kordillere und Pampa Mittel-Patagoniens (Argentinien). Von Dr. W. Vallentin. 2. Auflage. Berlin: H. Paetel, 1912. Size 10 × 7, pp. iv. and 206. *Illustrations. Price* 5*s.*

Argentine—Nahuel-Huapi. **Rovereto.**

Atti R.A. Lincei, Rendiconti (*Sc. fisiche*) V. **20** (1911): 524–527.

Sulla geomorfologia del lago del Nahuél Huapé e della valle del Rio Negro. Di G. Rovereto.

Argentine and Bolivia. **Heger.**

Franz Heger. Bericht über zwei Reisen nach Amerika. (Sonder-Abdruck aus dem xxiv. Bande der Annalen der k.k. Naturhist. Hofmuseums.) Vienna, 1910. Size 11 × 7½, pp. 53–70.

Chile. **Steffen.**

Der Anteil der Deutschen an der geographischen und geologischen Erforschung der Republik Chile während der ersten Jahrhunderts ihres Bestehens. Von Dr. Hans Steffen. (Sonderabdruck aus "Deutsche Arbeit in Chile; Festschrift des Deutschen Wissenschaftlichen Verein zu Santiago zur Zentenarfeier der Republik Chile.") Santiago, 1910. Size 10 × 6½, pp. 60.

Panama. *B.G.S.Philadelphia* **9** (1911): 124–139, 188–201; **10** (1912): 51–62. **Waldo.**

The true romance of Panama. A brief account of the earliest explorations and the first surveys for an interoceanic waterway. By Fullerton L. Waldo. *Illustrations.*

Panama Canal. **Isthmian Canal Commission.**

Canal Record. Published weekly under the authority and supervision of the Isthmian Commission. Vols. 1–4. September 4th, 1907, to August 23rd, 1911. Ancon, Canal zone. 1908–1911. *Illustrations. Presented by the Isthmian Canal Commission.*

Peru—Maynas. *B.R.S.G. Madrid* **53** (1911): 487–501. **Beltrán y Rózpide.**

Maynas: breve noticia geográfica é historica. Por Ricardo Beltrán y Rózpide.

South America. **Cameron.**

A woman's winter in South America. By Charlotte Cameron. London: S. Paul & Co., [1912]. Size 8 × 5, pp. 292. *Sketch-map and Illustrations. Presented by the Author.*

West Indies, British. **Aspinall.**

The British West Indies; their history, resources, and progress. By Algernon E. Aspinall. London: Sir J. Pitman & Sons, 1912. Size 8½ × 5½, pp. xii. and 436. *Map and Illustrations. Price* 7*s.* 6*d. net.*

West Indies—Geology. *Quart. J. Geol. S.* **67** (1911): 681–700. **Guppy.**

On the geology of Antigua and other West Indian Islands, with reference to the physical history of the Caribbean Region. By R. J. Lechmere Guppy. *Sketch-maps and Section.*

AUSTRALASIA AND PACIFIC ISLANDS.

Anthropogeography. *B.G.S. Philadelphia* **10** (1912): 36–50. **Hubbard.**

The influence of gold and silver mining upon the characters of men. By Dr. George D. Hubbard.

Australia—Geology. *J. and P.R.S. New South Wales* **45** (1911): 4–60. **David.**

Notes on some of the Chief Tectonic Lines of Australia. Presidential Address by Dr. T. W. Edgeworth David. *Maps and Sections.*

Australia—Physiography. **Daneš.**

On the physiography of North-eastern Australia. By Dr. J. V. Daneš. (From the *Proceedings of the Royal Bohemian Society of Science* November, **24**, 1911.) Prague, 1911. Size 9 × 6, pp. 18.

Australia—Railway. **Deane.**

Parliament of the Commonwealth of Australia. (Department of Home Affairs.) Kalgoorlie to Port Augusta railway: Report of the Consulting Railway Engineer (H. Deane). Melbourne, 1911. Size 13 × 8½, pp. 22.

See note in the Monthly Record, March, p. 287.

Caroline Islands. **Deeken.**

Die Karolinen. Nach eigenen Reisebeobachtungen, älteren Monographien und den neuesten amtlichen Berichten, von Richard Deeken. Berlin: W. Süsserott, [1912]. Size 8½ × 5½, pp. 142. *Illustrations. Price* 4*m.*

Crozet Islands. **Drygalski and others.**

Deutsche Südpolar-Expedition, 1901–03 (Drygalski), Bd. II.:—

Pp. 299–314: Geographie der Crozet-Inseln. Von Erich von Drygalski. *Map and Profile.*

Pp. 315–324: Geologische Beobachtungen auf der Possession-Insel. Von E. Philippi. *Illustrations.*

Pp. 325–334: Gesteine von der Possession-Insel. Von R. Reinisch. *Illustrations.*

Pp. 335–344: Die Tiere und Pflanzen von Possession-Eiland. Von E. Vanhöffen.

Fiji. *Quarterly Rev.* **216** (1912): 55–78. **Im Thurn.**

Fiji as a Crown Colony. By (Sir) Everard im Thurn. *Map.*

Heard Island.

Deutsche Südpolar-Expedition, 1901–1903 (Drygalski), Bd. II.:—

Pp. 223–240: Geographie von Heard-Eiland. Von E. v. Drygalski. *Illustrations and Sketch-map.*

Pp. 241–250: Geologie der Heard-Insel. Von E. Philippi.

Pp. 251–264: Gesteine der Heard-Insel. Von R. Reinisch. *Illustrations.*

Pp. 265–272: Tiere und Pflanzen der Heard-Insel. Von E. Vanhoffen.

Pp. 273–298: Skizze des Klimas der Heard-Insel. Von W. Meinardus. *Diagrams.*

Kerguelen Island. **Werth and others.**

Deutsche Südpolar-Expedition, 1901–03 (Drygalski), Bd. II.:—

Pp. 89–184: Aufbau und Gestaltung von Kerguelen. Von E. Werth. *Maps, Sections, and Illustrations.*

Pp. 185–208: Geologische Beobachtungen auf Kerguelen. Von E. Philippi. *Illustrations.*

Pp. 209–222: Petrographische Beschreibung der Kerguelen-Gesteine. Von R. Reinisch. *Illustrations.*

New Guinea, German. **Werner.**

Kaiser-Wilhelms-Land: Beobachtungen und Erlebnisse in den Urwäldern Neuguineas. Von Dr. Eugen Werner. London & Freiburg i. Br., Herder, 1911. Size 8½ × 6, pp. xiv. and 314. *Sketch-maps and Illustrations. Price* 7*s. Presented by the Publisher.*

Oceania—Geology. **Marshall.**

Oceania. By Dr. P. Marshall. Heidelburg, 1911. Size 10½ × 7, pp. 36. *Sketch-maps and Sections.*

[In 'Handbuch der regionalen Geologie;' herausgegeben von Steinmann und Wilckens, Band vii. 2 Abt., 1911.]

Pacific Islands. **Rannie.**

My adventures among South Sea cannibals: an account of the experiences and adventures of a Government official among the natives of Oceania. By Douglas Rannie. London: Seeley, Service & Co., 1912. Size 9 × 6, pp. 314. *Sketch-map and Illustrations. Price* 16*s. net.*

Papua—Ethnology. **Williamson.**

The Mafulu mountain people of British New Guinea. By Robert W. Williamson. London: Macmillan & Co., 1912. Size 9 × 6, pp. xxiv. and 364. *Map and Illustrations. Price* 14*s. net. Presented by the Publishers.*

St. Paul and New Amsterdam. **Drygalski and others.**

Deutsche Sudpolar-Expedition, 1901–03 (Drygalski), Bd. II. :—

Pp. 345–366: Geographie von St. Paul und Neu Amsterdam. Von E. v. Drygalski. *Maps and Illustration.*

Pp. 367–384: Geologie der Inseln St. Paul und Neu Amsterdam im Indischen Ozean. Von E. Philippi. *Illustrations.*

Pp. 385–398: Gesteine von St. Paul und Neu Amsterdam. Von R. Reinische. *Illustrations.*

Pp. 399–410: Tiere und Pflanzen von St. Paul und Neu Amsterdam. Von E. Vanhöffen.

POLAR REGIONS.

Antarctic—British Expedition. **National Antarctic Expedition.**

National Antarctic Expedition, 1901–1904. Natural History. Vol. **6**: Zoology and Botany. London: British Museum (Natural History), 1912. Size $12\frac{1}{2} \times 9\frac{1}{4}$, pp. xvi. and 106. *Illustrations. Price* 16*s. Presented by the British Museum (Natural History).*

This completes the series of Natural History reports.

Antarctic—Gaussberg. **Drygalski and others.**

Deutsche Südpolar-Expedition, 1901–03 (Drygalski), Bd. II. :—

Pp. 1–46: Der Gaussberg; seine Kartierung und seine Formen. Von E. v. Drygalski. *Map and Illustrations.*

Pp. 47–72: Geologische Beschreibung des Gaussbergs. Von E. Philippi. *Illustrations.*

Pp. 73–88: Petrographische Beschreibung der Gaussberg-Gesteine. Von R. Reinisch. *Illustrations.*

Antarctic—German Expedition. **Drygalski.**

Deutsche Südpolar-Expedition, 1901–1903 . . . herausgegeben von Erich von Drygalski. Bd. **2** (Geographie und Geologie). Berlin: G. Reimer, [1906–]1912. Size $13\frac{1}{2} \times 10$, pp. viii. and 662. *Maps and Illustrations. Presented by the Imperial Foreign Office, Berlin.*

Arctic—Environment. *J.G.* **10** (1912): 145–151. **Tarr.**

Human life in the Arctic. By Ralph S. Tarr.

Arctic—Icedrift. *Arkiv för Mathematik, etc.* **6** (1911): No. 40, pp. 12. **Åkesson.**

An Astronomical method for determination of icedrift in the neighbourhood of the Pole. By O. A. Åkesson. *Diagram.*

Greenland. *Z. Deuts. u. Österr. Alpenv.* **42** (1911): 78–97. **Quervain and Stolberg.**

Fjord-, Berg- und Schneeschuhfahrten in Grönland. Von A. de Quervain und A. Stolberg. *Illustrations.*

Greenland—Glaciers. **Koch and Wegner.**

Danmark-Ekspedition til Grønlands Nordøstkyst, 1906–1908. Bind vi. Nr. 1. Die glaciologischen Beobachtungen der Danmark-Expedition. Von I. P. Koch und A. Wegener. Copenhagen, 1911. Size 11 × 7, pp. 78. *Maps and Illustrations.*

Spitzbergen—Relief. **Drygalski.**

Abh. K. Bayerisch. A. W., Math.-phys. Kl. **25** (1911): No. 7, pp. 62.

Spitzbergens Landformen und ihre Vereisung. Von Erich von Drygalski. *Illustrations and Sections.*

MATHEMATICAL GEOGRAPHY.

Aerial navigation. *Ann. Hydrographie* **39** (1911): 609–610. **Topp.**

Kurs- und Geschwindigkeitsindikator für Luftschiffe. Von R. Topp. *Diagrams.*

Barometric heights. *Met. Z.* **28** (1911): 385–401. **Kohlschütter.**

Die periodischen Fehler barometrisch bestimmter Höhenunterschiede in der innern Tropenzone, und ein Satz von Teisserenc de Bort. Von Dr. E. Kohlschütter. *Diagrams.*

Cartography. *Z. Ges. E. Berlin* (1911): 645–659. **Oestreich.**

Das Gelände in der Kartendarstellung. Von Prof. Dr. Karl Oestreich. *Maps.*

Geodesy. **Bigourdan.**

J.-B.-J. Delambre. Grandeur et figure de la terre. Ouvrage augmenté . . . et publié par les soins de G. Bigourdan. Paris: Gauthier-Villars, 1910. Size 10 × 6½, pp. viii. and 402. *Sketch-maps and Diagrams. Price* 15 *fr.*

This work was left in manuscript by Delambre on his death in 1822. It is now published in a somewhat revised form, with explanatory notes.

Latitudes. **Albrecht and Wanach.**

Zentralbureau der Internationalen Erdmessung; Neue Folge der Veröffentlichungen, Nr. 22. Resultate des Internationalen Breitendienstes, Band iv. Von Th. Albrecht und B. Wanach. Berlin, 1911. Size 11½ × 9, pp. vi. and 276. *Maps, Illustrations, and Diagrams.*

Navigation—Tables. **Blackburne.**

Tables for azimuths, great-circle sailing, and reduction to the meridian, with a new and improved "Sumner" method: Latitudes 90° N. to 90° S.; Declinations 90° N. to 90° S. Also other useful navigational tables. . . . By H. S. Blackburne. [3rd Edit.] Published by the direction of the Hon. the Minister of Marine. Wellington, N.Z., 1911. Size 10 × 6, pp. xii. and 160. *Diagrams. Price* 6*s. net. Presented by the Author.*

Surveying. **Craig.**

Ministry of Finance, Egypt. Survey Department. Some general principles of Surveying. By J. I. Craig. Cairo, 1911. Size 10½ × 7, pp. 20 and x.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Geology. **Jukes-Browne.**

The student's handbook of stratigraphical geology. By A. J. Jukes-Browne. 2nd Edit. London: E. Stanford, 1912. Size 8 × 5½, pp. xvi. and 668. *Sketch-maps, Sections, and Illustrations. Price* 12*s. net. Presented by the Publisher.*

Geomorphology. **Hobbs.**

Earth features and their meaning: an introduction to geology for the student and the general reader. By William Herbert Hobbs. New York [London: Macmillan & Co.], 1912. Size 9 × 5½, pp. xl. and 506. *Sketch-maps, Illustrations, and Diagrams. Price* 12*s.* 6*d. net. Presented by the Author.*

Glaciology. **Philippi and Reinisch.**

Deutsche Südpolar-Expedition, 1901–1903 (Drygalski), Bd. II.:—

Pp. 617–628: Die Schuttführung der Eisberge und des Inlandeises. Von E. Philippi. *Illustrations.*

Pp. 629–640: Erratische Gesteine (besonders aus Eisbergen.) Von R. Reinisch.

Magnetic Declination. *Terrestrial Magnetism* **16** (1911): 133–136. **Bauer and Peters.**

Magnetic chart errors and secular changes in the Indian Ocean. By L. A. Bauer and W. J. Peters.

See note in the March number, p. 289.

Meteorology—Atmosphere. **Cave.**

The structure of the atmosphere in clear weather: a study of soundings with pilot balloons. By C. J. P. Cave. Cambridge: University Press, 1912. Size 11 × 9, pp. xii. and 144. *Sketch-maps, Illustrations, and Diagrams. Price* 10*s.* 6*d. net. Presented by the Publishers.*

Meteorology—Temperature. **Exner.**

Sitzb. K.A.W. Wien, IIa Abt. **120** (1911): 181–230.

Ueber den Wärmeaustausch zwischen der Erdoberfläche und der darüber fliessenden Luft, mit einen Anhang über die Ausbreitungsgeschwindigkeit kalter Luft. Von Felix M. Exner. *Sketch-maps and Diagrams.*

Oceanography. **Lütgens.**

Ergebnisse einer ozeanographischen Forschungsreise in dem Atlantischen und dem südöstlichen Stillen Ozean. Von Dr. Rudolf Lütgens. (Sonderabzug aus dem Archiv der Deutschen Seewarte, 34. Jahrgang, 1911.) Hamburg, 1911. Size 12 × 9½, pp. 74. *Charts and Illustrations.*

This expedition was referred to in vol. **35**, p. 84.

Oceanography—Adriatic. **Kesslitz and others.**
M. k.k. G. Ges. Wien **54** (1911): 457–475.

Bericht über die zweite Kreuzungsfahrt S.M.S. *Najade* in der Hochsee der Adria, 16. Mai bis 4. Juni 1911. In Auftrage des Vereines zur Förderung der naturwissenschaftl. Erforschung der Adria erstattet von W. v. Kesslitz, Prof. Dr. A. Grund und Prof. Dr. C. I. Cori. *Sketch-charts and Illustrations.*

See note in the January number, p. 80.

Oceanography—Atlantic Ocean. *Ann. Hydrographie* **39** (1911): 471–485. **Liepe.**

Temperaturschwankungen der Meersoberfläche von Ouessant bis St. Paul-Fels. Von Dr. H. Liepe. *Diagrams.*

Oceanography—Deposits. **Philippi.**

Deutsche Südpolar-Expedition, 1901–1903 (Drygalski), Bd. II.:—

Pp. 411–616: Die Grundproben der Deutschen Südpolar-Expedition, 1901–1903. Von E. Philippi. *Maps.*

Oceanography—Light-penetration. **Bertel.**
B.I. Océanog. Monaco, No. 219 (1911): pp. 10.

Sur une nouvelle méthode de recherches qualitatives de la lumière dans des profondeurs différentes de la mer. (Note préliminaire.) Par Prof. Rudolf Bertel. *Diagram.*

Oceanography—North Atlantic. *Z. Ges. E. Berlin*, 1911: 443–453. **Helland-Hansen.**

Neue Forschungen im Nördlichen Atlantischen Ozean. Von Dr. Björn Helland-Hansen. *Sketch-charts, Diagrams, and Illustrations.*

Oceanography—North Atlantic. **Hjort.**
Internat. Rev. Hydrobiologie, etc. **4** (1911), 152–173, 335–361.

Die Tiefsee-Expedition des *Michael Sars* nach dem Nordatlantik im Sommer 1910. Von Dr. Johan Hjort. *Sketch-charts, Diagrams, and Illustrations.*

Oceanography—South Atlantic. *Ann. Hydrographie* **39** (1911): 647–665. **Klaehn.**

Ueber die Meeresströmungen zwischen Kap Horn und der La Plata-Mündung. Von Johannes Klaehn. *Sketch-maps.*

Physical Geography—Text-book. **Du Toit.**

Physical geography for South African Schools. By Alex. L. Du Toit. Cambridge: University Press, 1912. Size 8 × 5½, pp. xii. and 250. *Maps and Illustrations. Price 4s. 6d. net. Presented by the Publishers.*

Phytogeography. *National G. Mag.* **22** (1911): 879–907. **Fairchild.**

New plant immigrants. By David Fairchild. *Illustrations.*

Terrestrial Magnetism. **Chree.**

Studies in terrestrial magnetism. By Dr. C. Chree. London: Macmillan & Co., 1912. Size 9 × 6, pp. xxi. and 206. *Diagrams. Price 5s. net. Presented by the Publishers.*

Volcanoes. *M.V.E. Leipzig*, 1910 (1911): 25–27. **Schneider.**

Ueber das Wesen vulkanischer Erscheinungen und die Methoden seiner Untersuchung. Von Dr. Karl Schneider.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Historical. **McDougall.**

The beginnings of history. By Ellen M. McDougall. London: Charles W. Kelly (1912). Size 7½ × 5, pp. viii. and 264. *Map. Price 2s. 6d. net. Presented by the Publisher.*

Historical—Greek Geography. **Dieterich.**

Byzantinische Quellen zur Länder- und Völkerkunde. (5–15 Jhd.) Von Karl Dieterich. i.–ii. Teile. (Quellen und Forschungen zur Erd- und Kulturkunde, herausgegeben . . . von Dr. R. Stübe, Band 5.) Leipzig: Otto Wigand, 1912. Size 10½ × 7, pp. (Part 1) xlii. and 140; (Part 2) viii. and 198. *Illustrations. Price M.16. Presented by the Publisher.*

History of Cartography. *Z. Ges. E. Berlin* (1911): 406–420, 453–479. **Kretschmer.**

Handschriftliche Karten der Pariser National-Bibliothek. Von Prof. Dr. K. Kretschmer.

See note in the Monthly Record for December, 1911, p. 629.

History of Cartography. *G.Z.* **17** (1911): 502–517. **Schmidt.**

Die Galleria Geografica des Vatikans. Von Everhard Schmidt.

See May number, p. 498.

History of Cartography. *Deuts. G. Blätter* **34** (1911): 120–129. **Wolkenhauer.**

Aus der Geschichte der Kartographie. Die Kartographie der Griechen und Römer. Von W. Wolkenhauer.

Tropical hygiene. **Crispin.**

The prevention and treatment of disease in the Tropics. A handbook for officials and travellers, compiled chiefly for the use of officials in the Sudan. By Dr. Edward S. Crispin. London: Charles Griffin & Co., 1912. Size 6 × 4½, pp. 96. *Price* 1*s*. *Presented by the Publishers.*

Tropical hygiene. **Lukis and Blackham.**

Tropical hygiene for Anglo-Indians and Indians. By the Hon. Surgeon-General C. P. Lukis and Major R. J. Blackham. London: Thacker & Co., 1911. Size 9½ × 6, pp. vi. and 176. *Illustrations. Price* 4*s*. 6*d*. *net. Presented by the Publishers.*

BIOGRAPHY.

Biography—Work of Reference. **Stephenson.**

Who's Who in science (International), 1912. By H. H. Stephenson. London: J. & A. Churchill, [1912]. Size 9 × 5½, pp. xvi. and 324. *Price* 6*s*. *net. Presented by the Publishers.*

A useful book of reference, though as subjects on the borderland between Science and the Humanities are excluded, geography is not very fully represented.

Richthofen. *M.F. von Richthofen-Tages* (1911): 71–78. **Baschin.**

Ferdinand Freiherr von Richthofen als preussischer Staatsbeamter. Von Otto Baschin.

Steub. *Z. Deuts. u. Osterr. Alpenv.* **42** (1911): 71–77. **Dreyer.**

Ludwig Steub, der Alpenwanderer und Alpenschilderer. Von Dr. A. Dreyer.

GENERAL.

Bibliography—Catalogue.

Catalogue annuel de livres et de documents sur la Cartographie, la Géographie, les Voyages, XV^e^—XIX^e^ siècles. En vente dans la Librairie Ancienne de Frederik Muller et Cie. Amsterdam, 1912. Size 11 × 7½, pp. viii. and 184.

British Empire. **Tilby.**

The English people overseas. Vol. 4: Britain in the Tropics, 1527–1910. By A. Wyatt Tilby. London: Constable & Co., 1911. Size 8½ × 5½, pp. viii. and 452. *Price* 6*s*. *net. Presented by the Publishers.*

British Empire. **Woodward.**

A short history of the expansion of the British Empire, 1500–1911. By William Harrison Woodward. [3rd Edit.] Cambridge: University Press, 1912. Size 7½ × 5, pp. viii. and 348. *Maps. Price* 4*s*. *Presented by the Publishers.*

British Empire—Communications. **Bright.**

Telegraphic communications in their relation to the Empire. By Charles Bright. (Extract from the *Empire Review and Magazine*, vol. **22**, December, 1911.) London, 1911. Size 9½ × 6½, pp. 323–332.

Carnegie Institution.

The Carnegie Institution of Washington. Founded by Andrew Carnegie. Scope and Organization. Issued on the occasion of the Tenth Anniversary, December 14, 1911. [Washington, 1911.] Size 11 × 7, pp. 34. *Illustrations.*

Describes the various activities of the Institution, including that of the Department of Terrestrial Magnetism.

Colonies. **Régismanset.**

Charles Régismanset. Questions coloniales (1900–1912). Paris: E. Larose, 1912. Size 7½ × 5, pp. 272. *Price* 3 *fr*. 50. *Presented by the Author.*

Covers a wide field, as it deals with recent developments, not only in European Colonies in various continents, but also in such countries as China.

Education—Excursions. **Piggott.**

School visits and journeys, their value and their practice in education. By Horace Piggott. London: J. M. Dent & Sons, 1912. Size 7 × 4½, pp. 96. *Illustration. Price* 1*s. net. Presented by the Publishers.*

Education—Text-book. **Dicks.**

Cambridge Geographical Text-Books. (General editor, G. F. Bosworth.) Intermediate. By A. J. Dicks. Cambridge: University Press, 1912. Size 8 × 5½, pp. xii. and 362. *Sketch-maps, Illustrations and Diagrams. Price* 3*s. Presented by the Publishers.*

Education—Text-book. **Longmans.**

Longmans' Geographical Series. Book 3: The World, for senior students. New edition. London: Longmans, Green, & Co., 1912. Size 7½ × 5, pp. x. and 614. *Maps, Diagrams, and Illustrations. Price* 4*s.* 6*d. Presented by the Publishers.*

French Colonies—Resources. **Capus and Bois.**

Les produits coloniaux: origine; production, commerce. Par G. Capus et D. Bois. Paris: A. Colin, 1912. Size 7½ × 4½, pp. xvi. and 688. *Sketch-maps and Illustrations. Price* 7 *fr. Presented by the Publishers.*

Geography—Text-book. **Heaton.**

The Junior Scientific Geography. Book V. The monsoon region of Asia. By Ellis W. Heaton. London: Ralph, Holland & Co. (1912). Size 7½ × 5, pp. viii. and 80. *Sketch-map and Illustrations. Price* 10*d. net. Presented by the Publishers.*

Year-Book. **Keltie.**

The Statesman's Year-Book: statistical and historical annual of the States of the world for the year 1912. Edited by Dr. J. Scott Keltie. London: Macmillan & Co., 1912. Size 7½ × 5, pp. lxxxiv. and 1428. *Maps. Price* 10*s.* 6*d. Presented by the Publishers.*

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

Balkan Peninsula. **Langhans.**

Politisch-militärische Karte der Balkan-Halbinsel zur Veranschaulichung der italienischen Flottenaktion im Ägäischen meere und der militärischen Massnahmen der Balkanstaaten. Bearbeitet von Prof. Paul Langhans. Scale 1 : 1,500,000 or 1 inch to 23·6 stat. miles. Gotha: Justus Perthes, 1912. *Price* 1*m.*

British Isles—England and Wales. **Ordnance Survey.**

Sheets published by the Director-General of the Ordnance Survey, Southampton, from April 1 to 30, 1912.

6-inch scale maps:—

Cheshire, 5 sheets. **Lancashire**, 1 sheet. **Sussex**, 6 sheets. **Yorkshire**, 6 sheets. *Price* 1*s. each.*

1 : 2500 scale maps:—

Revised, with houses stippled, and with areas. *Price* 3*s. each.*

Berkshire, 17 sheets. **Cheshire**, 9 sheets. **Denbighshire**, 2 sheets. **Flintshire**, 6 sheets. **Lancashire**, 36 sheets. **Sussex**, 19 sheets. **Yorkshire**, 18 sheets.

(*E. Stanford, London Agent.*)

British Isles—Ireland. **Bartholomew.**

Ireland. The "Autocar" Map for Motorists. [By John Bartholomew & Co.] Scale 1 : 443,520 or 1 inch to 7 stat. miles. [London: Iliffe & Sons, 1912.]

Shows roads in red, with distance between places in red figures. Main roads are distinguished from others by being shown in a thicker line. Railways are shown in black.

British Isles—Scotland. **Bartholomew.**

Bartholomew's Pocket Plan of Edinburgh and Suburbs, reduced by permission from the Ordnance Survey. Scale 1 : 18,000 or 3·5 inch to 1 stat. mile. Edinburgh : John Bartholomew & Co., [1912]. *Price, mounted on cloth, 1s. Presented by the Publishers.*

Europe. **Schröder.**

Karte der Häufigkeit der Schwankungen um den Frostpunkt. Gezeichnet von Paul Schröder. Scale 1 : 15,000,000 or 236·7 stat. miles. *Petermanns Mitteilungen*, Jahrgang 1912, I. Tafel 47. Gotha : Justus Perthes, 1912. *Presented by the Publishers.*

Germany—Prussia. **K. Preuss. Landesaufnahme.**

Karte des Deutschen Reiches. Königreich Preussen. Herausgegeben von der Kartogr. Abteilung der Kgl. Preuss. Landesaufnahme. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheet : (Kupferdruck Ausgabe) 100, Marienburg. Berlin : R. Eisenschmidt, 1912. *Price 1.50m. each sheet.*

Germany—Saxony. **K. Sächs. Generalstabes.**

Karte des Deutschen Reiches. Königreich Sachsen. Herausgegeben von der Abteilung für Landesaufnahme des Königl. Sächs. Generalstabes. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheet : (Kupferdruck Ausgabe) 467, Greiz. Dresden : G. A. Kaufmann, 1912. *Price 1.50m. each sheet.*

Switzerland. **Schweiz. Geolog. Commission.**

Geologische Karte der Schweiz. Herausgegeben von der Schweiz. geolog. Commission. Bearbeitet von Alb. Heim und C. Schmidt. Scale 1 : 500,000 or 1 inch to 7·8 stat. miles. Bern : A. Francke, 1912. *Presented by the Swiss Geological Commission.*

ASIA.

Asia Minor. **Kiepert.**

Karte von Kleinasien bearbeitet von Dr. Richard Kiepert. Zweite berichtigte Ausgabe. Scale 1 : 400,000 or 1 inch to 6·3 stat. miles. Sheets : B II., Brussa ; C III., Konia. Berlin : Dietrich Reimer (Ernst Vohsen), 1912.

The second edition of these two sheets, with corrections and additions. The lowlying land is now distinguished by a green tint, as is the case with other sheets of this edition. The Konia sheet adjoins the Brussa sheet on the south-east, and together they extend from the Sea of Marmora to about 50 miles south of Konia, and show the line of the railway.

China. **Anz.**

Das Hinterland von Tschifu [Chefoo], (Nordseite der Schangtung-Halbinsel). Nach Originalaufnahmen von Walter Anz. Scale 1 : 300,000 or 1 inch to 4·7 stat. miles. *Petermanns Mitteilungen*, Jahrgang 1912, I., Tafel 49. Gotha : Justus Perthes, 1912. *Presented by the Publisher.*

Japan. **Harada.**

Geological map. Division II. Compiled by Dr. Toyokichi Harada. Scale 1 : 400,000 or 1 inch to 6·3 stat. miles. 6 sheets. Tokyo : Imperial Geological Survey, 1911. *Presented by the Imperial Geological Survey of Japan.*

A geological map, printed in colours, of the central part of Hondo, based upon the results of the recent surveys and investigations of Japanese geologists.

Japan. **Imperial Geological Survey of Japan.**

Mineral distribution of the Japanese Empire. Scale 1 : 2,000,000 or 1 inch to 31·5 stat. miles. 4 sheets. Tokyo : Imperial Geological Survey of Japan, 1911. *Presented by the Imperial Geological Survey of Japan.*

An outline map of Japan, Korea, and Formosa, showing the location and distribution of minerals by colours and symbols. There is also a table giving in figures the quantities of mineral production, based on the statistics for the year 1908. Lettering is in Japanese and English.

Japan. **Imperial Geological Survey of Japan.**

Topographical map of Japan. Scale 1 : 200,000 or 1 inch to 3·2 stat. miles. Sheets : Hiroshima ; Ichinohe ; Shichinohe. Tokyo : Imperial Geological Survey, 1911. *Presented by the Imperial Geological Survey of Japan.*

Java. **Topographical Bureau, The Hague.**

Topographische Kaart der Afdeelingen Pasoerocan, Bangil en Malang van de Residentie Pasoerocan. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. 4 sheets. The Hague: Topographical Bureau, 1911.

AFRICA.

Africa. **Survey Office, Khartum.**

Map of Africa. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Anglo-Egyptian Sudan. Sheets: 35–J, Murrat; 35–O, J. Shigrib. Khartum: Survey Office, 1912. *Price* 10 *P.T. each sheet. Presented by the Director of Surveys, Sudan Government, Khartum.*

British East Africa. **Geographical Section, General Staff.**

Provisional map of East Africa Protectorate. Scale 1 : 1,500,000 or 1 inch to 23·6 stat. miles. Published by the Geographical Section, General Staff, War Office. London: E. Stanford, Sifton Praed, T. Fisher Unwin, 1910. *Price* 2*s. net.*

German South-West Africa. **Sprigade and Moisel.**

Deutsch-Südwestafrika. Bearbeitet von Paul Sprigade und Max Moisel. 2. verbesserte und vermehrte Auflage 1912. Scale 1 : 2,000,000 or 1 inch to 31·5 stat. miles. Berlin: Dietrich Reimer (Ernst Vohsen), 1912.

Morocco. **Cuerpo de Estado Mayor del Ejército, Madrid.**

Mapa de los Terrenos ocupados en el Rif. Scale 1 : 50,000 or 1·3 inches to 1 stat. mile. 4 sheets. Madrid: Deposito de la Guerra, 1910.

A map of the country around Melilla made by Spanish officers during the campaign of 1909. It is printed in colours, and shows contours at intervals of 40 metres. A supplementary sheet is given of the theatre of Spanish operations in September, 1911.

Morocco. **[Service Géographique de l'Armée, Paris.]**

Région de Mélilla. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. 2 sheets. [Paris: Service Géographique de l'Armée], 1912.

A roughly drawn map in black and white, showing the Spanish posts and camps.

Morocco. **Service Géographique de l'Armée, Paris.**

Maroc. Scale 1 : 200,000 or 1 inch to 3·2 stat. miles. Sheets: Mehdia; Taza, 1912. Chaouïa. Scale 1 : 100,000 or 1 inch to 1·6 stat. miles. 4 sheets. 1912. Beni Meskine-Tadla. Scale 1 : 200,000 or 1 inch to 3·2 stat. miles. 2 sheets, 1912. Environs de Bir-Mechiguig. Scale 1 : 50,000 or 1·3 inch to 1 stat. mile, 1911. Meknès-ez-Zitoum. Scale 1 : 40,000 or 1·6 inch to 1 stat. mile. 1911. Paris: Service Géographique de l'Armée, 1911–12.

Morocco. **Weisgerber.**

Carte provisoire de la Région de Fez, levée et dressée par le Dr. F. Weisgerber. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Paris: Henry Barrère, 1912. *Presented by the Publishers.*

Morocco. **Zietz.**

Höhenschichtenkarte des Atlasvorlandes von Marokko. Entworfen von Dr. Rudolf Zietz. Scale 1 : 2,250,000 or 1 inch to 35·5 stat. miles. *Petermanns Mitteilungen*, Jahrgang 1912, I., Tafel 48. Gotha: Justus Perthes, 1912. *Presented by the Publishers.*

West Africa. **Service Géographique des Colonies, Paris.**

Carte des Fuseaux Horaires de l'Afrique Occidentale Française. Scale 1 : 6,000,000 or 1 inch to 94·7 stat. miles. Paris: Service Géographique des Colonies, [1912]. *Price* 1 *Fr. Presented by the Service Géographique des Colonies, Paris.*

An outline map of French West Africa, divided into three meridional sections showing the times used in different regions: (1) the "Fuseau Fondamental" extending from long. 7° 30′ E. to 7° 30′ W., in which the time used is the same as that of France and Algeria, now Greenwich Mean Time; (2) The "Fuseau des Canaries," which includes all the region to the west of the 7° 30′ W. meridian, and where the time is one hour behind that of the Fuseau Fondamental; and (3) the "Fuseau de l'Europe Centrale," which includes all the territory to the east of the meridian 7° 30′ E., and in which the time is one hour in advance of the Fuseau Fondamental.

AMERICA AND WEST INDIES.

Brazil. **Commissão Geografica e Geologica do Estado de S. Paulo.**

Estado de S. Paulo. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheets: Mococa; S. Sebastião do Paraizo. S. Paulo: Commissão Geographica e Geologica

do Estado de S. Paulo, 1911. *Presented by the Commissão Geographica e Geologica do Estado de S. Paulo.*

Canada. **Department of the Interior, Ottawa.**

Cereal map of Saskatchewan showing acreage under crops in each township in wheat, oats, barley, and flax, 1910. Scale: 792,000 or 1 inch to 12·5 stat. miles. Second edition. Ottawa: Department of the Interior, 1910. *Presented by the Department of the Interior, Ottawa.*

A new edition of a large outline map showing acreage of cereals under crop in each township by circles of colours and sizes, combined with figures on the circles. Each cereal concerned has a separate colour, and altogether it is a remarkably graphic and interesting map, conveying a large amount of information.

Mexico. **Secretaria de Estado y del Despacho de Fomento.**

Carta de la Republica Mexicana. Scale 1: 100,000 or 1 inch to 1·6 stat. mile. Sheets: 2-IV., M, Q, R, V, X, Z; 3-III., U; 5-II., B, C, D, E, G, H, I, J, M, N; 6-I., A, B, F, G, H, L, M, R; 11-I., Y; 11-III., D, H, I, L, M, N, O, Q, R, S, T, V, X, Y, Z; 14-I., B, C, D, E, H, I, J, M, N, O, R, S, T; 19-II., X. Mexico: Secretaria de Estado y del Despacho de Fomento, 1906–1911. *Presented by the Mexican Government.*

North America. **Stanford.**

Stanford's Library Map of North America. Scale 1: 5,274,720 or 1 inch to 83·2 stat. miles. New edition, 4 sheets. London: Edward Stanford, 1912. *Price* £1 15*s.*

This well-known map has undergone considerable revision, and many important corrections have been made, although in some parts the topography requires further attention to bring it up to date. It is one of the first maps to show the new extended boundaries of Manitoba and Quebec.

Trinidad. **Girod.**

Plan of Port of Spain and Suburbs. Prepared by J. Girod from the most recent surveys. Scale 1: 7,920 or 8 inches to 1 stat. mile. Port of Spain: Muir, Marshall & Co., 1912. *Price* 10*s.*

United States. **Sifton, Praed & Co.**

Sifton, Praed's new map of Virginia and Maryland to illustrate the campaigns of 1861 to 1864. Scale 1: 633,600 or 1 inch to 10 stat. miles. London: Sifton, Praed & Co., 1912. *Price in sheet form,* 1*s.* 6*d.* *Presented by the Publishers.*

This is the first of a series of maps about to be published by Messrs. Sifton, Praed & Co., illustrative of military operation in the United States. Places of historical importance and railways are indicated. It might have been well to have given some heights in figures, in addition to the hill shading. For students of American history, a series of this kind should be useful.

POLAR REGIONS.

Arctic. **Langhans.**

Die für 1912–14 geplanten Nordpolarforschungen. Nach den Orginalangaben der Expeditionsleitungen. Scale 1: 30,000,000 or 1 inch to 473·5 stat. miles. *Petermanns Mitteilungen,* Jahrgang 1912, I., Tafel 46. Gotha: Justus Perthes, 1912. *Presented by the Publishers.*

GENERAL.

World. **Debes.**

E. Debes' neuer Handatlas über alle Teile der Erde in 65 Haupt- und über 130 Nebenkarten mit alphabetischem Namenverzeichnis. 4. stark vermehrte und verbesserte Auflage. Lieferung 11. Leipzig: H. Wagner & E. Debes, 1912. *Price* 1 *Mark each part.*

This part contains the following maps: No. 34, Spanien und Portugal; 35, Italien.

World. **St. Martin and Schrader.**

Atlas Universel de Géographie construit d'après les sources originales et les documents les plus récents, cartes, voyages, mémoires, travaux geodesiques, etc., avec un texte analytique. Ouvrage commencé par M. Vivien de Saint Martin et continué par Fr. Schrader. No. 52, Inde N.-E., Tibet. Paris: Hachette & Cie., 1912. *Presented by the Publishers.*

This part contains Sheet VII. of the ten-sheet map of Asia on the scale of 1: 5,000,000. It embraces the whole of Tibet, the northern part of India, Chinese Turkestan, together with large portions of the adjacent territories. The explorations and surveys carried on in Central Asia during the last ten or fifteen years have been very extensive, and in many parts have completely altered the maps of the regions concerned; indeed, there has been so much new work that cartographers have found it a difficult matter to keep pace with it. Still, the compilation of this sheet has evidently been carried out with care from the best available sources of information, a list of which is supplied as a leaflet with the sheet itself. However, it may be noted that the boundaries of Bengal remain as they were before the latest arrangement. As a specimen of draughtsmanship and engraving, this sheet, like the others of the atlas, is all that could be desired, but on many of the maps the names are greatly obliterated by the black hachering of the hill work, and if it could be arranged later on in some future edition to transfer the hills to a separate stone, and print them in brown, it would be a great advantage, and much lighten the general appearance of the maps; but this would of course be a most costly business, and perhaps too much to expect.

With the publication of this sheet this atlas is complete, and M. Schrader and all those who have assisted him are to be congratulated on bringing it to a successful termination. The atlas was commenced so long ago as 1877, by the late M. Vivien de Saint-Martin, and after his death it was carried on by M. Fr. Schrader, who had previously assisted in its preparation, and whose cartographical works are deservedly well known in all parts of the world. Since this atlas was started, thirty-five years ago, great progress has been made with geographical discoveries, explorations, and new surveys, so that naturally the first maps issued have become quite obsolete, and most of the others of even comparatively recent dates require thorough revision; but it is satisfactory to learn that arrangements have been made for issuing new editions. The maps are all engraved on copper, and this necessarily slow progress, combined with the expense doubtless goes a long way to account for the many years it has taken to complete the work; but it has often been regretted that it has not been found possible to finish the atlas in a more reasonable time. There are altogether ninety maps measuring 17 inches by 21 inches, with numerous insets, all of which are excellent specimens of the usual style of good map production at the time of the commencement of the atlas, and perhaps it was necessary to continue this style to the end; although this has rendered it impossible to take advantage of some of the recent improvements in cartography, not the least of which is the general introduction of colour printing for different topographical features.

There is at present no index to place-names, nor is there any mention of one being in preparation.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, from March 31 to April 27, 1912. *Presented by the Hydrographer, Admiralty.*

New Charts—No. 3761, North sea, Germany: Friesche Zeegat to Jade river, 5*s*.—**New Editions**—1607, England, east coast: North Foreland to the Nore, 4*s*. 1626, England, east coast: Blyth, 3*s*. 2182*b*, The North sea, northern sheet, 4*s*. 2202*b*, South Atlantic ocean, western portion, 4*s*. 342, Nova Scotia: Port Medway to Lunenburg, 3*s*. 624, Africa, west coast: Bonny and New Calabar rivers, 3*s*. 1360, Africa, west coast: Barako to Cape St. Paul (Plan: Accra), 2*s*. 636, Africa, south coast: Cape of Good Hope and False bay, 3*s*. 123, Africa, south coast: Table bay breakwater and docks, 3*s*. 1920, Africa, south coast: Table bay, 3*s*. 834, Bay of Bengal: Bassein river and approaches, 3*s*. 3487, Philippine islands: Manila and Kavite anchorages, 2*s*. 1466, China, south coast: Hongkong, Fotaumun pass, 3*s*. 1459, China, south coast: Hongkong harbour, 3*s*. 1602, China, east coast: approaches to the Yangtse kiang, 3*s*. 1271, Bays and anchorages on the east coast of Korea: Fontina point to Linden point, including Kornilof, Egerman, and Anna bays; Sivuch, Tizenko, and Stepanof bays. Plans of Ostolopof bay and Sintzchzyan bay on this sheet erased. New plan of Iion (Pallada) road on this sheet. Plans added: Hagamu and Yan to anchorages. Sonjin po and Immyon sea (Plaksin bay), 3*s*. 873, North Pacific ocean: Amami group. New plans of Naze ko and O shima kaikyo on this sheet, 2*s*. 1058, Australia, west coast: Rottnest island to Warnbro' sound, showing the approaches to Gage roads, Swan river, and Cockburn sound (Plans: Cockburn sound, North and South channels), 3*s*. 1750, Australia, south coast: Port Adelaide, 3*s*. 2747, Australia, south coast: Entrance to Port Phillip, including the banks and channels, 5*s*. 1700, Australia, west coast: Freemantle harbour and Gage roads, 3*s*. 1752, Australia, south coast: Approaches to Port Adelaide, 2*s*. 1171*a*, Australia,

south coast: Port Phillip, southern sheet, 3*s*. 960, Tasmania: Approaches to Hobart, including D'Entrecasteaux channel and Derwent river, 4*s*. 1670*b*, Australia, east coast: Moreton bay, southern portion, 3*s*. 1674, Australia, east coast: Brisbane river, 4*s*. 1069, Australia, east coast: Port Jackson, North and Middle harbours, 5*s*. 691, Australia, north coast: Normanby sound and Prince of Wales channel, 2*s*. 437, Australia, north coast: Albany pass to Booby island, including Endeavour strait, Normanby sound, Prince of Wales, and Dayman channels, 3*s*. 3419, Australia, north coast: Goode Island anchorage, 2*s*. 3484, New Zealand, South island: Awarua or Bluff harbour, 3*s*. 982, Pacific ocean, Caroline islands: Truk or Hogolu islands, Tsis anchorage, Lossop islands, and Oroluk lagoon, 2*s*. 1730, Pacific ocean: Samoa or Navigator islands (Plans: Matautu harbour, Uafato bay, Falifa harbour, Fungasar harbour, Saluafata harbour, Fangaloa bay, Massefau bay, Fangalii bay, Vailele bay, Hübner bay, Faleasau bay, Rose island, Safatu harbour, Afono bay, Falealili harbour, Asaua harbour, Satupaitea road, Vatia anchorage, Sili road). New plans of Pago Pago (Pango Pango) harbour and Leone bay on this sheet, 3*s*.

(*J. D. Potter, Agent.*)

America—Great Lakes. **U.S. Weather Bureau.**

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Pacific, South. **U.S. Hydrographic Office.**

Pilot chart of the South Pacific Ocean, June, July, and August, 1912. Washington: U.S. Hydrographic Office, 1912. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Australia. **MacKay.**

Fifty-six photographs taken on a bicycle trip across Australia in 1899, by Donald MacKay, Esq. *Presented by Donald Mackay, Esq.*

The route followed was from Brisbane to Derby, West Australia, *viâ* the Northern Territory. These photographs were taken with a small Kodak, and measure only 2½ inches by 3½ inches.

(1) Country near Gympie; (2) My companion riding across a railway bridge between Brisbane and Gladstone; (3) Water-hole in ironstone formation between Burketown and Normanton; (4) Mr. Harry Redford crossing street in Burketown; (5) Horse-team coming into main street, Burketown; (6) Horse-team between Burketown and Camooweal; (7) Post with notice marking the dividing line between Queensland and South Australia, near Camooweal; (8) Crossing the tablelands, Northern Territory; (9 and 10) Gregory river; (11) Corella water-holes; (12) Horse-team in Northern Queensland; (13) Newcastle waters on overland telegraph; (14) Dogs kept at Newcastle station to warn manager of approach of hostile natives; (15) Black's grave near Powell's creek; (16) Breaking in a horse, Elsie Station; (17) One of A. Forest's marked trees at Pigeon Holes; (18) White man's grave between Catherine river and Pine creek; (19) View on Adelaide river; (20) Augusta's crown between Catherine and Victoria rivers; (21 and 22) Haura falls, Haura river; (23) Spot where we first struck Victoria river; (24) Baobab tree between Victoria river and Jasper's gorge; (25) Native women near Price's creek; (26) Victoria river, tidal to this point; (27) Alligator, 13 feet long, Horse creek; (28) Cotton bush; (29) Bottle trees, entrance to Jasper's gorge; (30) Baobab tree; (31) White ant hill, between Pine creek and Darwin; (32) White ant hills; (33) Alexandra station; (34) Northern Territory homestead; (35) A level patch on track to Ora river; (36) King river, tributary of Catherine river; (37) Black soil country near Price's creek; (38) Pandanus palms, Crawford springs; (39) Pool in East Bains river; (40) Limestone country between Behn river and Wild Dog creek; (41) Belt of Redstone about 30 miles from Behn river; (42) Negri river; (43) Brook creek; (44) Pond in Elvira river; (45) Water-snake, 13 feet long; (46) Williams' garden, 15 miles from Brookman; (47) Homestead Ord river station; (48) One Side Hardman gap; (49) Pyramid hills, west of Kimberley; (50) Upper Fitzroy river; (51) Jeda station, Fitzroy river; (52) Main-street, Derby; (53) Derby racecourse; (54) Dead Horse creek, after heavy rains; (55 and 56) Water-holes, North-Western Australia.

St. Helena. **Jackson.**

Twenty-four photographs of St. Helena, taken by T. Jackson, photographer, St. Helena, [1911]. *Presented by Colonel Sir Henry Galway,* K.C.M.G., O.S.O.

A good set of photographs, meaning 5¾ inches by 8½ inches, giving a clear idea of the scenery, buildings, and places of historical interest.

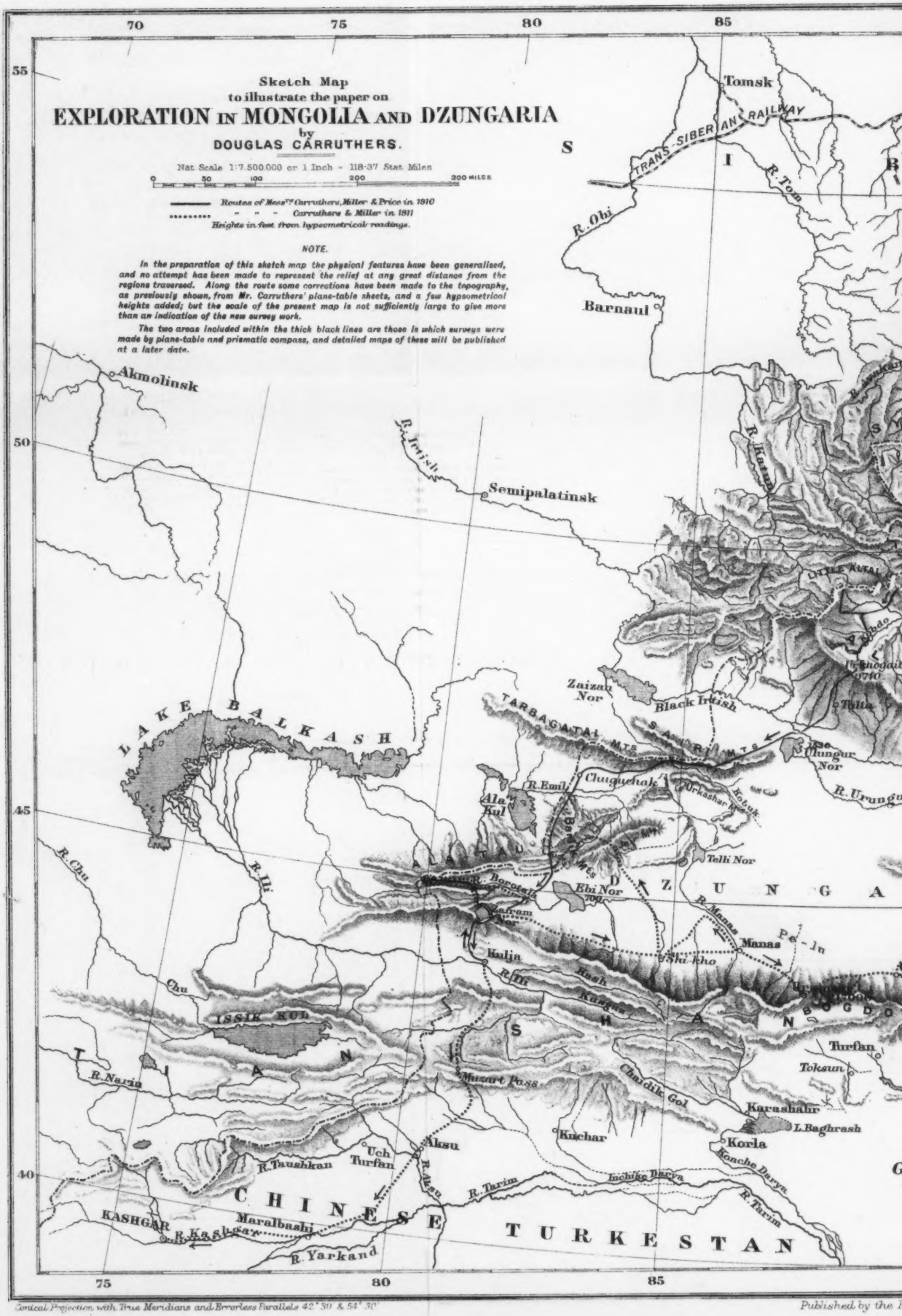
(1) South-east side of the island; (2) Rupert's bay; (3 and 4) High Knoll fort; (5) The Briars and Heart Shape waterfall; (6) Tree ferns on Diana's peak; (7) Sandy bay; (8) "Lot" part of basaltic dyke; (9) Diana's peak; (10) St. Helena landing; (11) The "Ladder"; (12) Jamestown, from the sea; (13) Jamestown; (14) Main street, Jamestown; (15) St. Paul's cathedral; (16) E.T.C. station, the Briars; (17) Government House; (18) Civil hospital; (19) Drying Flax; (20) House in which Napoleon spent his first night ashore; (21) Hutt's gate, road to Longwood; (22) Longwood Old House in March, 1859; (23) Longwood Old House at present time; (24) Napoleon's tomb.

Tripoli. **Djamy Bey.**

Ten photographs of Tripoli, taken by Major Djamy Bey. *Presented by Dr. Adolf L. Vischer.*

(1) Ghat; (2) The well of Ghat; (3) Sheikh Oufnaid of the Mengasaten Tuaregs; (4) Sheikh Eteissi of the Hoggar Tuaregs who murdered the Flatters mission; (5) Tuaregs with their chief Eugadezen; (6) Tuaregs and their Mehari camels; (7 and 8) A young Tuareg noble; (9) Two Tuaregs; (10) Sheikh Ali of the Fogass Tuaregs.

N.B. It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.


Sketch Map
to illustrate the paper on
EXPLORATION IN MONGOLIA AND D'ZUNGARIA
by
DOUGLAS CARRUTHERS.
Nat Scale 1:7,500,000 or 1 Inch = 118·37 Stat. Miles
0 50 100 200 300 MILES
Routes of Mess^rs Carruthers, Miller & Price in 1910
" " " Carruthers & Miller in 1911
Heights in feet from hypsometrical readings.
NOTE.
In the preparation of this sketch map the physical features have been generalised, and no attempt has been made to represent the relief at any great distance from the regions traversed. Along the route some corrections have been made to the topography, as previously shown, from Mr. Carruthers' plane-table sheets, and a few hypsometrical heights added; but the scale of the present map is not sufficiently large to give more than an indication of the new survey work.
The two areas included within the thick black lines are those in which surveys were made by plane-table and prismatic compass, and detailed maps of these will be published at a later date.
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Tomsk
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L. Baghrash
Kuchar
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R. Aksu
R. Tarim
Inchike Darya
Konche Darya
KASHGAR
R. Kashgar
Maralbashi
R. Yarkand
CHINESE TURKESTAN
DZUNGARIA
TIAN SHAN
S I B E R I A
MONGOLIA
Conical Projection, with True Meridians and Errorless Parallels 42° 30' & 54° 30'
Published by the

by the Royal Geographical Society.

MONGOLIA
Carruthers.

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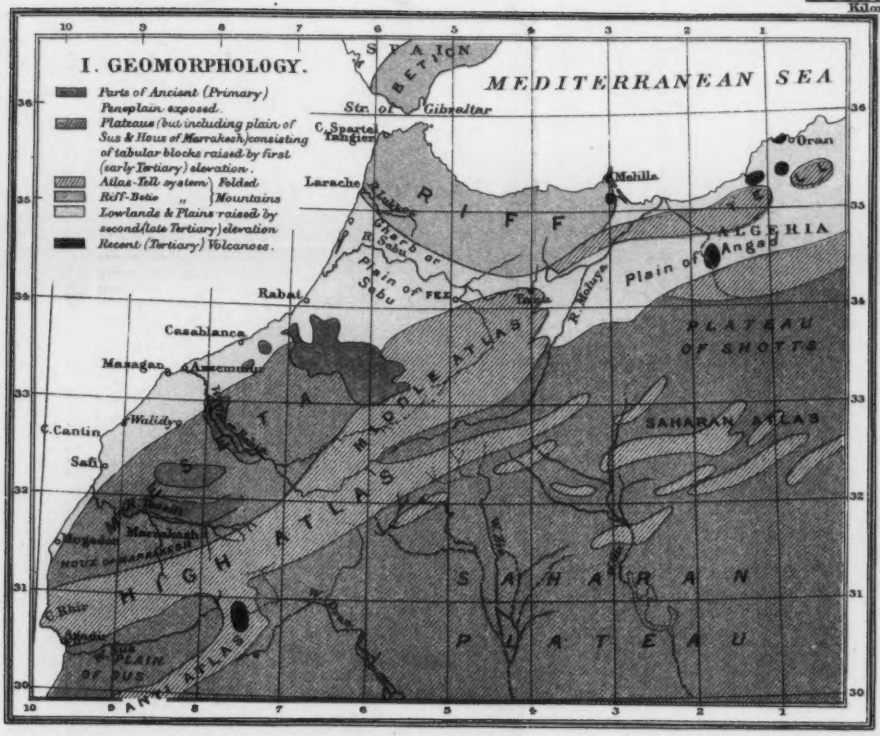

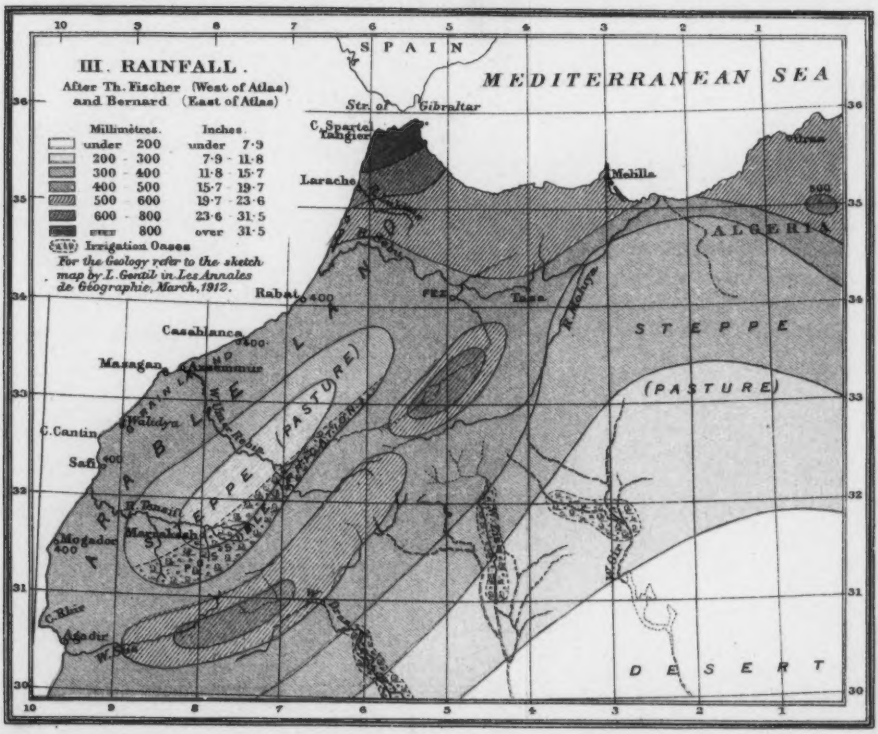

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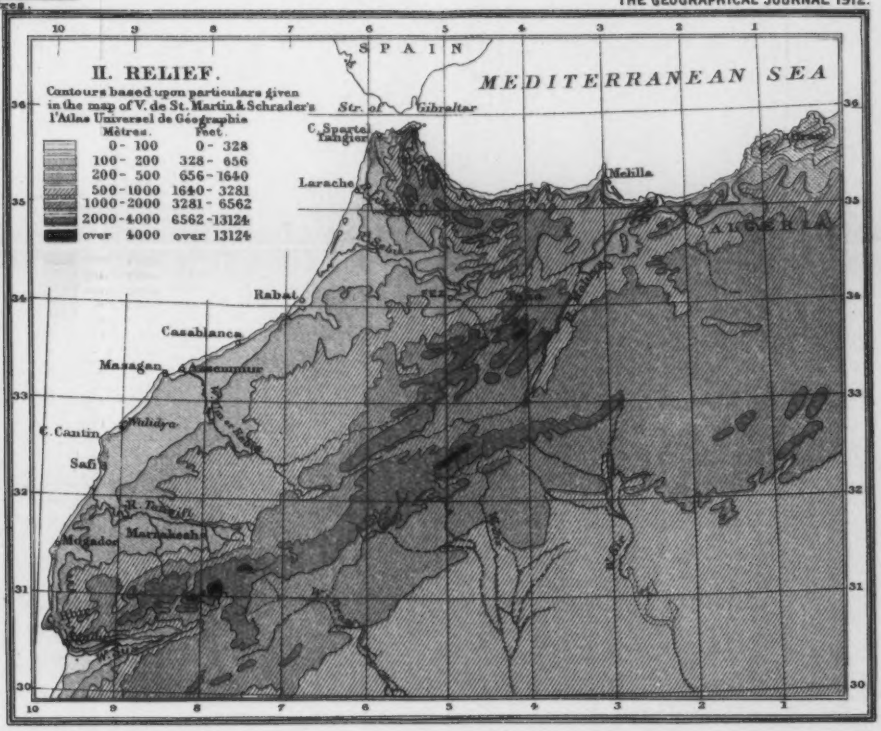

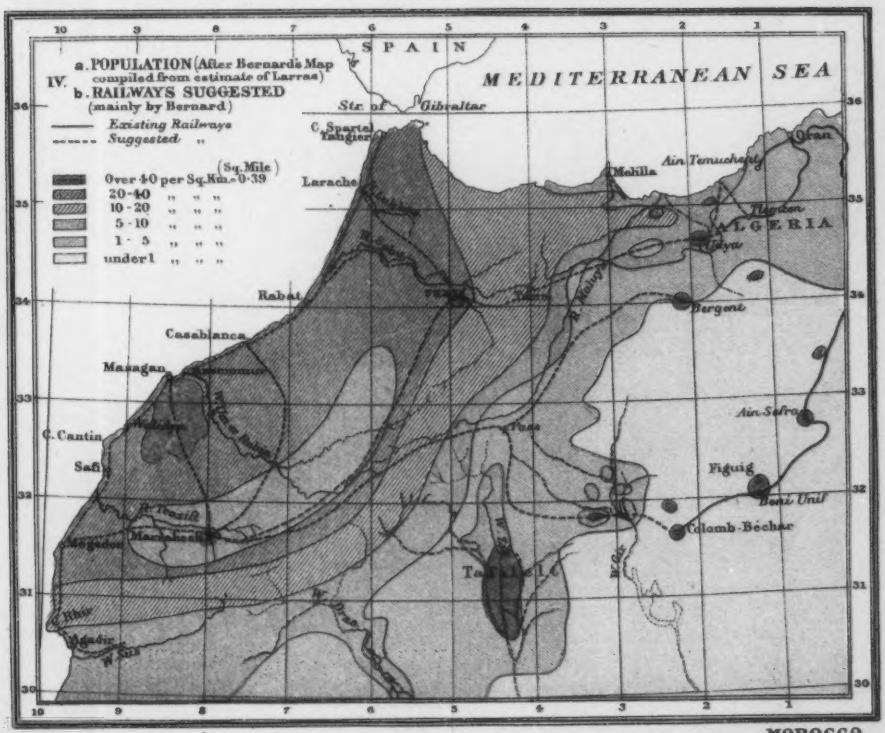

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